



IS UPS

Intrinsically Safe Uninterruptible Power Supply User Manual

**IECEX TSA 10.0008X Certified – Ex ia ma e I ($T_{amb} -20^{\circ}\text{C} < T_a < +60^{\circ}\text{C}$),
IP66 Ingress Approval**

Designed and Manufactured in Australia by Ampcontrol CSM Pty Limited ABN 35 000 770 141

Ampcontrol Electronics Phone: (02) 4903 4800 Fax: (02) 4903 4888

No Copies of the information or drawings within this manual shall be made without the prior consent of Ampcontrol.

User Manual Part No: 142834



Ampcontrol CSM Contact details:

7 Billbrooke Close, Cameron Park, NSW, 2285
P +61 2 4903 4800 | F +61 2 4903 4888

EMAIL: electronicsorders@ampcontrolgroup.com

WEB: ampcontrolgroup.com

Safety and other Warnings

WARNING! 	This safety alert symbol identifies important safety messages in this manual and indicates a potential risk of injury or even death to the personnel. When you see this symbol, be alert, your safety is involved, carefully read the message that follows, and inform other operators.
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CAUTION! 	This safety alert symbol identifies important information to be read in order to ensure the correct sequence of work and to avoid damage or even destruction of the equipment, and reduce any potential risk of injury or death to the personnel.
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	Supplementary information not directly affecting safety or damage to equipment. Carefully read the message that follows, and inform other relevant personnel.
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 ENVIRONMENTAL ALERT	Information concerning possible impact on the environment and actions required for prevention and proper response.
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Disclaimer

Ampcontrol CSM Pty Ltd will make no warranties as to the contents of this documentation and specifically disclaims any implied warranties or fitness for any particular purpose.

Ampcontrol further reserves the right to alter the specification of the system and/or manual without obligation to notify any person or organisation of these changes.

Before You Begin

We would like to take a moment to thank you for purchasing the I.S. UPS from Ampcontrol.

WARNING! 	To become completely familiar with this equipment and to ensure correct operation, we strongly recommend that you take the time to read and thoroughly understand this user manual.
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If this document is being read via a computer the hyper links may be used (Press control and click on the [blue highlighted](#) text to go to that topic).

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1 Receiving and Storage

1.1 Receiving

All possible precautions are taken to protect the equipment against damage or losses during shipment, however before accepting delivery, check all items against the packing list or Bill of Lading. If there are shortages or evidence of physical damage, notify Ampcontrol immediately.

Notify Ampcontrol within 7 days (maximum) in case of shortages or discrepancies, according to the packing list. This action will help ensure a speedy resolution to any perceived problems. Keep a record of all claims and correspondence. Photographs are recommended.

Where practicable do not remove protective covers prior to installation unless there are indications of damage. Boxes opened for inspection and inventory should be carefully repacked to ensure protection of the contents or else the parts should be packaged and stored in a safe place. Examine all packing boxes, wrappings and covers for items attached to them, especially if the wrappings are to be discarded.

1.2 Storage after Delivery

When the equipment is not to be installed immediately, proper storage is important to ensure protection of equipment and validity of warranty.

All equipment should be stored indoors, in a cool dry environment, on raised shelves, and protected from the elements. Ensure that the storage area is not an area where water will collect.

1.2.1 Battery Care and Storage

The storage period should be as short as possible. The temperature has an impact on the self-discharge rate hence it is important to store the batteries in a fully charged condition in a cool but frost-free room

The batteries will be delivered fully charged and installed inside the enclosure.

WARNING! 	DO NOT ATTEMPT TO REMOVE THE BATTERIES FROM THE ENCLOSURE. The UPS has no user serviceable parts. All repairs must be carried out by Ampcontrol personnel only. If a fault develops return the IS UPS to Ampcontrol for repair. It is essential that no attempt be made to repair the UPS as any attempt to dismantle or repair the UPS can seriously compromise the safety of the unit and the consequence can be fatal.
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If it is anticipated that the UPS will not be used and will remain disconnected from the mains power supply for a period of time exceeding the recommended maximum, the battery should be recharged before the maximum period is reached or the batteries could be permanently damaged. The maximum storage time at $\leq 20^{\circ}\text{C}$ is 6 months for 65WH models and 24 months for 300WH models. Higher temperatures cause higher self-discharge and shorter storage time between recharging operations.

We recommend re-charging the 65WH models every 4 months & 300WH models every 12 months while in storage.

To recharge the battery in this situation, connect a lead with mains plug to the units AC input terminals. Supply should be 110V to 250V AC. Turn the power on for the "Charging Time" as listed in section 3, [Specification](#).

1.3 Unpacking of Equipment

The method of packing used will depend on the size and quantity of the equipment. The following cautions should be interpreted as appropriate.

CAUTION! 	Take care when unpacking crates as the contents may have shifted during transport. This equipment is heavy. Use appropriate lifting techniques.
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 ENVIRONMENTAL ALERT	The disposal of packaging materials, replaced parts, or components must comply with environmental restrictions without polluting the soil, air or water. Ensure that any timber and cardboard used as packaging is disposed of in a safe and environmentally responsible manner. Where possible, dispose of all waste products i.e. oils, metals, plastic and rubber products by using an approved recycling service centre.
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2 Overview of Equipment

The Intrinsically Safe Uninterruptible Power Supply by Ampcontrol is designed for Group I applications.

The IS UPS converts 100VAC ~ 250VAC mains power to intrinsically safe low voltage DC power with a built in Battery Backup.

The IS UPS can be mounted by its back or base using M6 screws. The enclosure is of robust stainless steel construction with screw connection terminals inside an internal connection box in the top of the enclosure. This connection compartment is divided into 2 sections, one of the incoming AC power and the other for the various Intrinsically Safe circuits.

Note this compartment should only be opened if the external AC supply has been de-energised. Opening this compartment in a hazardous area when the AC supply is energised is not permitted.

All cables enter and exit the enclosure via appropriate cable glands. The cable glands must meet a minimum requirement of IP66 to maintain the integrity of the enclosure. A keypad and LCD display is located on the front of the enclosure to allow the user to set various parameters of the system and monitor the status.

Typical use of this power supply is for gas detection systems but it is also suitable for voice communication systems, Serial to Ethernet converters, and other electronic equipment requiring intrinsically safe power in a Group I application. The Intrinsically Safe UPS can be used as a simple backup system for IS circuits in line with the output parameters and the factory default configuration or can be user configured with optional functions.

The user can configure various functions of the UPS and use of the external i/o which includes 3 Digital inputs, 3 relay contacts and Modbus communications.

	WARNING! The UPS has no user serviceable parts. All repairs must be carried out by Ampcontrol personnel only. Should a fault develop, return the IS UPS to Ampcontrol for repair. It is essential that no attempt be made to repair the UPS as any attempt to dismantle or repair the UPS can seriously compromise the safety of the unit and the consequence can be fatal.
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3 Specification

IS Certified:	IECEX TSA 10.0008X, Ex e ia ma GROUP I IP66 (Tamb -20<Ta<+60degC)
Input Voltage:	100VAC ~250VAC, 50/60Hz
Input Current:	1Amp maximum at 100VAC with full load
Operating Temperature:	0-60°C
Dimensions:	300W x220 H x 225 D - 300WH model 180W x 220H x 210 D - 65WH model
Weight:	12kg for 65WH model and 24kg for 300WH model
IP Rating:	IP66
Charging time:	4hrs for 65Wh model and 19hrs for 300Wh model (From fully discharged).
Parameter:	Um = 250VAC
Output Parameters:	Refer Table 8 in Section 8.
Battery Backup Time:	By taking the safe discharge level of the battery into account, a conservative estimation of the battery backup time in hours = (Watt-Hour figure of the UPS) X 0.63 / (User's Load in Watt). For Example: if 15.1W (15.1Vx1Amp) is the user load on the 65WH 15.1V/1.5A rated UPS, then the estimated battery backup time in hours will be '(65x0.63) / (15.1x1)' = 2.71 hours.

WARNING! 	The unit should be installed and maintained in accordance with Regulatory Authority requirements, the conditions of the certification and any relevant standards.
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4 Installation

4.1 Mechanical Installation

Install the IS UPS in an area that complies with the relevant parts of the specifications in Section 7 '[Warnings for the Safe use of the IS UPS](#)'. The IS UPS is rated IP66.

- 4.1.1 Ensure adequate space above and below the unit to allow free air movement around the unit
- 4.1.2 Mounting the IS UPS should be done in such a way as to allow full access to the connection terminals, display and buttons. Positioning of the IS UPS should also be such to allow easy removal of the unit for repair. The IS UPS should also be clearly visible to allow inspections to be carried out without having to remove parts of the installation (visual inspections)

CAUTION! 	Wiring to the IS UPS must comply with any statutory, site or local wiring codes and Intrinsically Safe standards, as appropriate.
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Use applicable cable glands to ensure the IP66 rating of the enclosure is maintained and that requirements of local Mines Regulations for Exe and Intrinsically Safe "ia" wiring are complied with.

The IS UPS is supplied with an earthing stud. This is the chassis earth & should be connected to the earth.

Ensure the Earth, Neutral & Phase conductors at mains input are 0.5SQmm cable minimum.

The incoming AC supply earth wire should be connected to the earth terminal in the Ex e connection terminal block in the connection area at the top of the UPS. An additional chassis earthing stud is provided in this area.

For terminal connection details see Appendix Drawing ISUPS-E-007.

4.2 Ensuring Safe Installation

The IS UPS requires to be installed into a system along with appropriate devices providing input signals (sensors) and output control/indication (fan controls, beacons, sirens, SCADA systems etc.).

Before the IS UPS can be installed, there are a number of things that need to be considered and understood to prevent incorrect or unsafe operation of the IS UPS or the system into which it is installed.

Along with relevant competence, and an understanding of the target application, the following points should be considered:-

- 4.2.1 **Ensure that the information provided in section 7 is fully understood.**

It is extremely important that the limitations of the IS UPS are understood to prevent incorrect installation and use from creating a potentially dangerous risk. If in doubt as to the nature of the limitations or their implication, consult a competent authority such as a supervisor or Ampcontrol applications engineer.

4.2.2 Ensure that the application into which the IS UPS is being installed has been properly defined, approved and designed.

Any system intended to mitigate the risk of injury needs to be properly designed and implemented. Such a system must be the result of structured risk analysis with the outcomes used to define the system requirements. These requirements, in turn, will guide the choice of instrumentation, logic solvers and actuators needed to implement the system. Understanding the needs of the system will ensure proper selection of equipment.

4.2.3 Ensure that the IS UPS will properly perform the required functions within the system design.

It is important to understand how the IS UPS is intended to interact with other equipment within a system. For safe and reliable use, it is crucial that neither the IS UPS logical operation nor its signalling be compromised by incompatibilities with connected equipment.

4.2.4 Ensure that the intended devices to be connected to the IS UPS are compatible with the entity parameters as specified on the IS UPS certificate of compliance (conditions of safe use).

Check the terminal I.S parameters of all devices intended to be connected to the IS UPS against the IS UPS certificate of conformance. If in doubt, consult a competent authority, or contact an Ampcontrol applications engineer.

CAUTION!



The user is responsible for maintaining the Ex ia Intrinsic Safety rating by complying with the "List of Special Conditions" outlined in the certificate ([Appendix C – Approvals](#)).

4.3 Connecting to the IS UPS

Wiring of the IS UPS and systems must be carried out with reference to standards appropriate for the application, industry and/or locale. Failure to comply with standards could lead to a dangerously installed system.

4.3.1 Entity Parameters

When connecting the IS UPS to other equipment, it is important that the specified parameters that apply to each IS UPS terminal are known and understood. It is also important to know and understand these parameters in relation to connected equipment and cables. These parameters are given on the equipment's certificate of compliance and set the maximum limits, beyond which the equipment is no longer safe to use within its hazardous area certification. These specified limits, known as 'entity parameters' inform and restrict quantities such as voltages, currents, capacitance and inductance in relation to the terminals that will be used to connect to other equipment.

Inputs will have maximum allowable voltages and currents that may be applied to them along with maximum values of capacitance and inductance that appear at these terminals resulting from internal circuitry.

Typical input parameters would be:-

Ui: Maximum voltage that can be applied to an input terminal

Ii: Maximum current that can be supplied to an input terminal

Ci / Li: Maximum capacitance / inductance that 'appears' at an input terminal

Output terminals will have maximum values of voltages and currents available from them, specified under worst case conditions. Outputs also carry limitations regarding the maximum capacitance and inductance that they can connect to whilst maintaining safe operation. Output terminals may also specify the level of capacitance and inductance that appears on them as a result of internal circuitry.

Typical output parameters would be:-

Uo: Maximum voltage available from a terminal under worst case conditions

Io: Maximum current available from a terminal under worst case conditions

Co / Lo: Total capacitance / inductance that can be safely connected to a terminal

Capacitance is found in connecting cables and the inputs of other equipment. When connecting equipment together, the total values of all capacitances and inductances must be taken into account and must not exceed the values specified for that connection or system total. For example, if a gas detector's output terminal has 1nF of capacitance associated with it, and can connect safely to a maximum capacitance of 10nF, any equipment and cable that is to be connected to the gas detector must have a total capacitance of no more than 9nF.

4.3.2 Type of Cable

Cables that are used to connect the IS UPS to other parts of a system or other equipment must be adequately rated in terms of maximum voltages and current that it can handle safely.

Cable electrical resistance, capacitance and inductance must also be taken into account in order to maintain compliance with equipment / system entity parameters (see previous section). Cables will have resistance, capacitance and inductance parameters specified per unit length. It is therefore important to take into account the cable length used in an installation in respect to the total value of these parameters.

In addition to their electrical properties, cables must afford physical protection against being damaged by impact or abrasion. This applies particularly to cables that are external to a wall cabinet that houses the IS UPS.

Cables may be both electrically screened against noise interference as well as sheathed in a strong wire jacket to prevent crushing. Such cables would generally also be sheathed in a material that is resistant to abrasion and attack from chemicals such as fuels.

Refer to AS4871 and/or AS1972 for Group I installations.

4.3.3 Cable Termination

When connecting cables to the IS UPS, it is not sufficient to simply strip and twist a cable's inner conductor and insert into the IS UPS terminal. Stripped and twisted conductors must not be used and especially ones tinned with solder. Solder exhibits a behaviour known as 'cold-creep' and in effect would flatten under the pressure of the IS UPS's terminal screw. Once this happens, the connection is likely to become loose and unreliable. All connections to the IS UPS must be made via appropriate cable crimp connectors. The IS UPS's terminals can take a cable crimp of up to 2.5mm diameter.

4.3.4 Cable Marking

When making connections to the IS UPS, individual conductors should be marked with a cable marker or tag so that correct connections can be made across an entire system. Unmarked conductors are generally hard to have their function identified across the physical parts of a system. This could lead to potentially dangerous system operation due to mis-matched connections between equipment, as well as obvious system malfunction.

4.3.5 Cable Restraint

All connected cables that run from the IS UPS to other equipment must be suitable restrained to prevent stress on the IS UPS terminals. If cables are allowed to freely hang and pull against a terminals fixing screw, then eventually the connection could fail. Such unrestrained connections could create the potential of system malfunction, resulting in the creation of a hazardous risk situation. Proper cable restraint will ensure that the potential risk of system failures due to cable breakages is minimised.

5 Technical Description

5.1 Features

- LCD Display with Keypad input.
- “Mains On”, “Output On” and “Output Overload” indicator LED’s.
- “Stop LED” and “Reset LED”
- Local start/stop
- Remote start/stop
- Auto shutdown on low battery.
- Battery state and capacity indicators.
- Configurable alarms for:
 - i. Output over current.
 - ii. Output under current.
 - iii. Output under voltage.
 - iv. Battery over temperature.
- 3-output relays voltage free NO contacts. These can be configured for multiple alarm functions. Contacts are rated at 30V/3A.
 - i. Relay 1 is suitable for use with a separate intrinsically Safe circuit. ie The contact is isolated from the UPS intrinsically safe circuit.
 - ii. Relays 2 and 3 are suitable for use on the same intrinsically safe circuit (ie not isolated from each other) that may be separate to the IS circuits of the UPS or those utilised on Relay 1.
- 2-external isolated digital inputs (DI2,DI3) that may be used to activate functions as listed in Table 13.7.8. These can be powered from a common external intrinsically safe circuit or the IS UPS output.
- 1 non-isolated digital input (DI1) that can be configured to activate functions as listed in Table 13.7.8.
- Modbus RTU over RS485 communications port to monitor the device.
- Event and periodic logs.
- User configurable timer to shutdown UPS, while operating from battery.

6 Operation

The Intrinsically safe uninterruptible power supply exhibits very low output impedance. The output voltage is reduced by an average of 0.4V at full load. Precise current limiting provides maximum available current up to the I_o parameter. The power supply output acts as a current limited voltage source. The load impedance can vary down to short circuit while the maximum output current is maintained. This is a safety feature; we recommend not exceeding the load that reduces the output voltage to maintain the maximum output current.

The UPS has various configurable functions but for users who wish to use it in the simplest form an ex factory default setting is programmed into the unit prior to delivery. Refer to programming section 13.5 & 13.7 for details on programming and customise as required to suit specific application. A brief on the functionality is given below -

- The programmable output on time is set to "Always ON", the output will remain on even when the mains are switched off, and until the battery voltage reaches the low level. The output on time can be programmed to any time at 10-minutes steps. In this case the output will stop when the on time is expired. To initiate another cycle need to start either external momentary switch or the local keypad.
- Application of mains power will override any timer function and will automatically switch the DC output on if it is in an off status due to time out. If the UPS has been "stopped" by pressing the local "STOP" button prior to loss of mains supply the output will not be energised by the return of the mains supply.
- The minimum battery voltage level will switch the output off automatically ignoring the timer activity.
- Digital inputs are mapped 1 to 1 to the relays to mimic input status.

As part of its design as an Intrinsically Safe product the input AC supply to the UPS is protected by both a ceramic fuse and resettable thermal fuse (NTC), which is encapsulated into the electronics assembly. It is unlikely, but possible that repeated application of the mains supply over a short timescale (the thermal fuse not having enough time to recover) could cause the ceramic fuse to blow if the AC power supply is particularly noisy or at the limit of the permitted voltage.

To reduce any possibility of this protection device being activated it is recommended to avoid cycling power to the UPS frequently. Please follow the time intervals shown below between the consecutive applications of mains power to the UPS to avoid blowing the input ceramic fuse.

Mains Input Voltage	Ambient Temperature	Power Up intervals
110Vac	≤40degC	30-seconds
110Vac	>40degC	60-seconds
240/250Vac	≤30degC	60-seconds
240/250Vac	>30degC	3-minutes

Activation of the protective fuse would be indicated by the Mains LED not activating when AC power is applied to the UPS and in this case the UPS should be returned to Ampcontrol for service.

CAUTION! 	Maintain the time intervals between successive applications of mains to the UPS. Multiple applications of mains at insufficient intervals may risk blowing the internal fuse. Replacing a blown fuse will necessitate returning the unit to Ampcontrol for repairs (See warning in Section 2, Overview of equipment). This repair could be time consuming & expensive. (See detail above)
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On receipt of your UPS it should be in Stop mode. The front display will be off and the reset LED flashing.

6.1 LED Indication

On the front facia there are 5 status indication LEDS:

6.1.1 RESET LED

When the STOP button is pressed to stop/lock the UPS, this LED starts flashing, and remains flashing until the UPS is unlocked by pressing the RESET button. The LED remains flashing when the UPS is in lock mode. The application of mains power while UPS is locked will not start the UPS; it will be necessary to press the RESET button to unlock and then press the START button to start the UPS.

6.1.2 STOP LED

When the UPS is unlocked (by pressing the RESET button) it forces the STOP LED to begin flashing. This means that the UPS is ready to start and pressing and holding the START button for 1-second will start the UPS. The UPS may also be started by momentarily closing the terminals 'Start+' and 'Start In' located at X7 on the terminal Board. The successful start is indicated by the OUTPUT LED becoming illuminated at which time output will be available at the output terminals. The application of mains power while the UPS is unlocked will immediately start the UPS.

6.1.3 OUTPUT LED

This LED illuminates when the UPS is on.

6.1.4 OVERLOAD LED

This LED illuminates when the UPS is operating in current limit mode, and extinguishes when operating normally.

6.1.5 MAINS ON LED

This LED illuminates when the mains power is applied to the UPS, and extinguishes when mains power is switched off.

When operating from the battery the back light of the LCD display turns off 30-second after the last press on any button to save battery power. It is continuously illuminated when the mains is switched on.

6.2 Battery Life

CAUTION!



The "Reset" LED flashes continuously (<1-second intervals) to indicate that this equipment is in "Stand-by" mode and contains an operational battery pack. The battery life is 6-months for the 65WH and 24 months for the 300WH UPS when they are stored in the recommended manner.



Lead-acid batteries are recyclable products. Recognizing the need to be involved in the whole lifecycle of a battery and to protect the environment, EXIDE Technologies' factories recycle used lead. Contact your EXIDE Technologies representative who will advise you on this matter.

7 Warnings for the Safe Use of the IS UPS

WARNING! 	This equipment is designed to receive 110VAC to 250VAC. It also contains Battery backup which is indicated by a flashing LED. It is essential to be careful about the installation, use and storage of the IS UPS. To ensure safe operation, avoid nullifying the warranty and contravening the Certificate of Compliance, check the following:
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- The input/output parameters provided in [Table 8](#) in Section 8 must be taken into account when designing the system and installing the UPS onto an existing system. An assessment of the system should be carried out to ensure compliance with IS requirements.
- The mains power input must not be used when installed in Zone – 0.
- The IS UPS must be taken to a safe area for recharging when necessary, or powered under the provisions covered by the local mines regulations.
- The input Voltage range is within the limits permitted and the connections are to the designated input terminals.
- The load is connected to the designated output DC terminals.
- No alteration to this equipment is permitted without written consent from Ampcontrol. Do not allow any alteration to this product as this may violate the Intrinsic Safety rating and the consequences of that could be fatal.
- Do not allow the equipment operating beyond the specification. This will compromise the product-life and result in premature failure.
- Refer to [Table 8](#) for output parameters.
- Ex e or Ex d cable glands to the ISUPS MUST be used for non-I.S circuits which are to be connected to the ISUPS in a hazardous area.
- The installation of the I.S. UPS must be conducted in a manner conforming with the requirements of AS/NZS 60079, parts 0, 14, 17 and 25, in addition to any other standards relevant to the installation, industry or locale.

8 Product List with Capacity Details

There are eighteen models of IS UPS with a range of voltage and current limits that may be selected from Table 8, following. Various output options and battery capacity that are not shown in the Table can be manufactured on request as a system special.

	System specials will require longer lead times to manufacture.
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Part Number	Model	Battery Capacity WH	Co (μF)	Lo (μH)	L/R μH/Ohm
110284	15.1V/1.5A	300	1.00/2.09	200/181.5	87.17/79
110282	15.1V/1.5A	65	1.00/2.09	200/181.5	87.17/79
142542	15.1V/0.51A	300	1.00	200	87.17
142541	15.1V/0.51A	65	1.00	200	87.17
140369	15.1V/0.50A	300	1.00	200	87.17
140368	15.1V/0.50A	65	1.00	200	87.17
142540	15.1V/0.47A	300	2.01	520	87.17
142539	15.1V/0.47A	65	2.01	520	87.17
142544	14.5V/1.5A	300	1.00	200	87.17
142543	14.5V/1.5A	65	1.00	200	87.17
142546	12.6V/2.5A	300	2.0	167.2	33
142545	12.6V/2.5A	65	2.0	167.2	33
140367	12.6V/2.4A	300	2.0	167.2	33
140364	12.6V/2.4A	65	2.0	167.2	33
140366	12.6V/2.0A	300	0.502/20.54	164/102.1	40.1/39
140365	12.6V/2.0A	65	0.502/20.54	164/102.1	40.1/39
143451	12.8V/1.5A	300	1.00/2.09	200/181.5	87.17/79
144393	12.6V/1.5A	300	1.00/2.09	200/181.5	87.17/79

Table 8: Product list with battery backup capacity and output parameters

9 Output Characteristics

9.1 Typical Output Voltage VS Output Load Current Curve

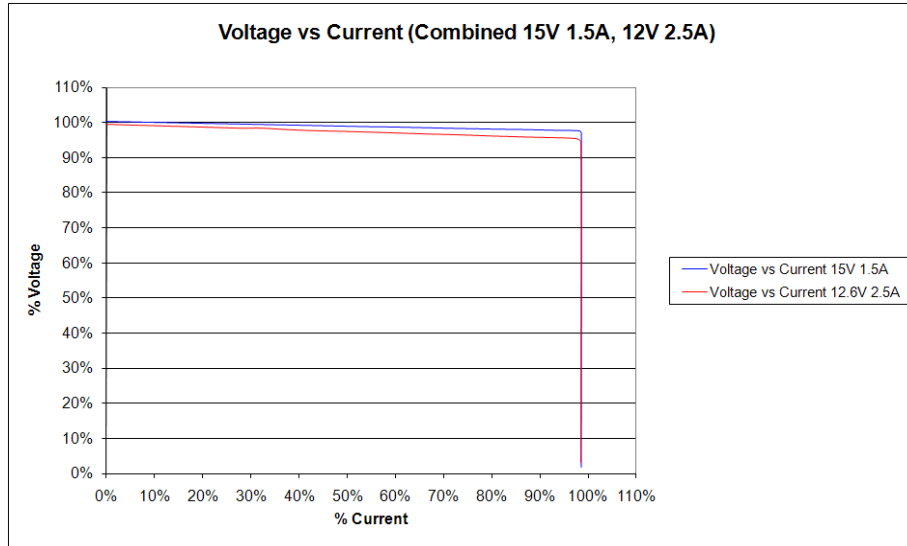


Figure 9.1: Typical Output Voltage VS Output Load Current Curve ISUPS

10 User Interface



The IS UPS is managed by using a 16 character x 2 line LCD display and a keypad.

The menus are divided into three user accessible groups as follows

10.1 Status Menu

The status menu displays information regarding the general status of the UPS such as Output ON/ OFF and Mains ON/OFF. Other information available from this menu by the use of the RIGHT button is: UPS Model, Serial Number, User Defined Label, Date and Time, Software and Hardware Version and Release Date.

10.2 Field Configurable Menus

The configuration menus coordinate and display changes to the settings that control the operation of the UPS. A password is required to gain access to the configuration menus. The factory default setting for the password is '0000' (four zeros).

It is recommended that the password be changed once the UPS has been configured after installation. Be sure to remember the password, as lost (or forgotten) passwords cannot be recovered. Creating a new password will necessitate resetting the password to the original factory '0000' prior to creating the new password.

CAUTION! 	If the password is reset it is very likely that all previous user settings will be lost and will revert to the ex factory default. (The same as when the unit was first delivered).
--	---

Refer to Section 13.4 for the [Password Management Menu](#).

10.3 Factory Configuration

This menu coordinates and displays factory changes to the attributes of the UPS that are defined at build time, including battery size, temperature coefficient, model number and serial number. These settings are not operator variable parameters.

11 Menu Navigation

Navigation of the menu is performed by pressing the arrow keys on the keypad. The backlight will be lit for round 30 seconds whenever a key is pressed while the unit is battery powered, and lit continuously when the unit is mains powered.



UP Key (Button)



DOWN Key (Button)



LEFT Key (Button)



RIGHT Key (Button)

From the power-on-default **Status Menu** (Section 10.1) pressing the UP key will allow navigation through the major menus, and pressing the DOWN key will navigate back. Pressing the RIGHT key will select the minor menus from the sub-menus. Repeated pressing of the LEFT key will navigate back to the major menus. These key actions are typical throughout the menus.

Each menu requires different settings or responses from the user, some keys may be de-activated all together or have a different action – but this depends upon each menu. In general the keys will operate as shown in Table 11 (immediately following).

Key	Status Menus		Configuration Menu	
	Major Menu MM/a	Sub-Menu MM/(b-n)	Major Menu CM/a	Sub-Menu CM/(b-n)
UP	Next menu	-	Previous menu	Increase setting value
DOWN	Previous menu	-	Next menu	Decrease setting value
RIGHT	Sub-menu	Next sub-menu	Sub-menu	Next sub-menu
LEFT	-	Previous sub-menu	-	Previous sub-menu

Table 11 - The function of the Menu Keys

12 Field Accessible Menu Structure

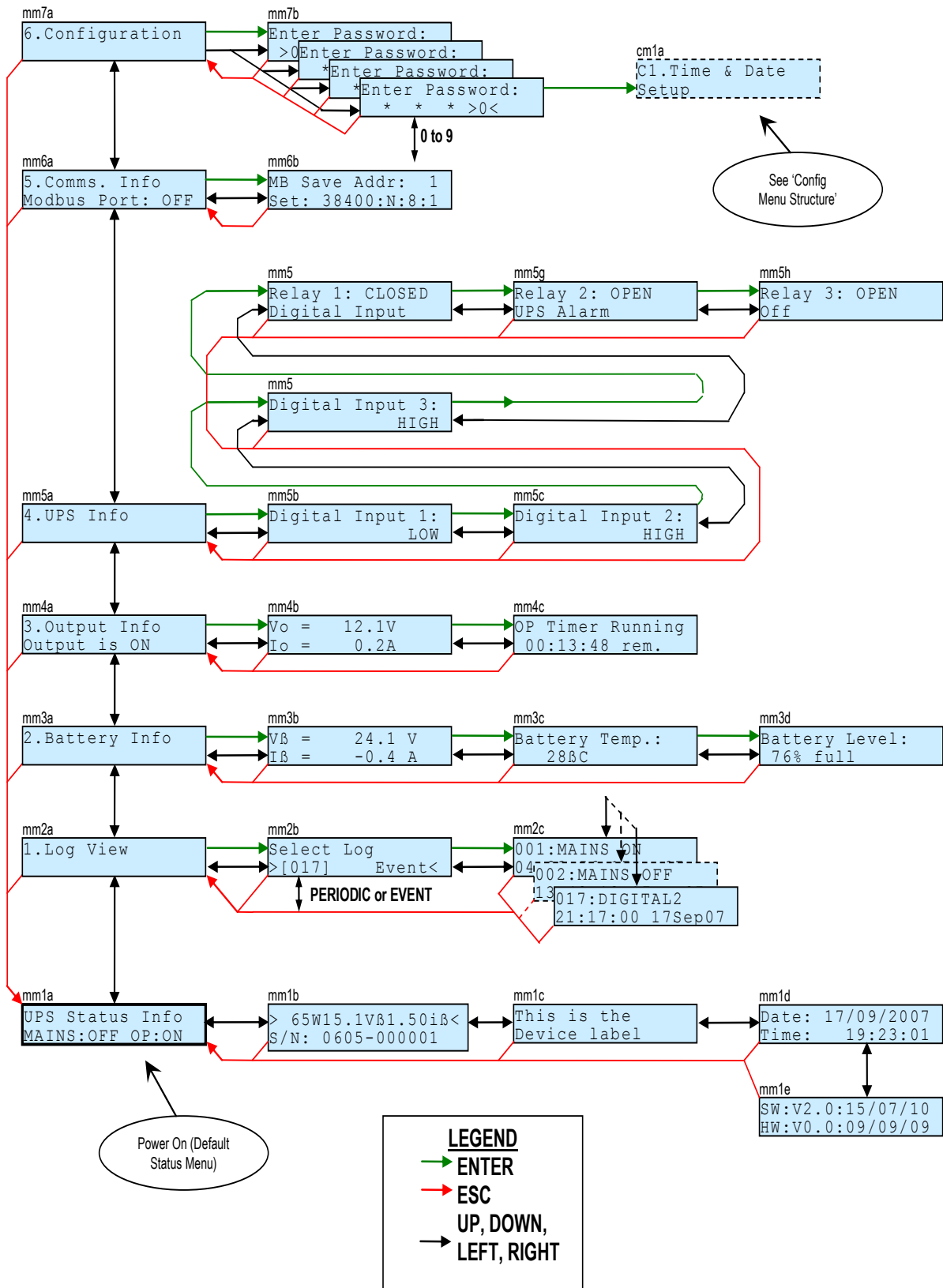


Figure 12 – Field Accessible Menu

12.1 Field Accessible Menus

12.1.1 Default Menu

The Default Status menu is displayed at power-up of the UPS. The bottom line displays the Mains status and Output status. From here navigation to all other menus can commence. From this menu the DOWN and the LEFT button have no effect. The UP button will change the menu focus to the [Log View Menu](#) Section 12.1.2; while the RIGHT button changes menu focus to show the Model, Serial Number, User Defined Label, Date & Time, SW & HW version menu. While in any of these menus the UP and DOWN menu have no effect and the LEFT button changes to previous menu.

Main and Output Status menu – displays the Mains ON/OFF status and Output ON/OFF status.

```
UPS      Status   Info
Mains:OFF OP:ON
```

Model and Serial Number menu – displays the model and Serial Number of the UPS.

```
>65W    15.1v    1.50i<
S/N:    ..00-00000
```

User defined Label menu – displays the blank window for user to write any identifying description etc.

```
.....
.....
```

Date and Time menu – displays date and time

```
Date:      01/01/2008
Time:      05:01:19
```

SW and HW version menu – displays Soft-Ware and Hard-Ware version. Press the LEFT or the ESC button to return to the [Default Menu](#).

```
SW:V2.0:15/07/10
HW:V0.0:09/09/09
```

12.1.2 Log View Menu

```
1.Log View
```

To view the log, press the UP button to select the “Log View” menu. To access the sub menus of the log view, press the right arrow to access the log selection menu. At this menu, and subsequent sub menus, Modbus reporting of the logs is suspended.

12.1.3 Select Log Menu

```
Select Log
>   Periodic<
```

At this menu, either the **Periodic Log** or the **Event Log** may be selected for viewing by pressing either the UP or DOWN button respectively. Pressing the RIGHT button will select the currently active option.

12.1.4 Periodic Log menu

```
001:
01:20:01 01Jan08
```

```
001:
U=13.2V: I= 0.2A
```

This menu will initially display ‘LOG START’. Press the UP button and the periodic log entries will be displayed, with the most recent entry being displayed first. ‘LOG END’ will be displayed when the other end of the log is reached.

The periodic log can display the entries that have been logged every 5 minutes for up to 6 days – 1,728 entries in total. To assist with rapid navigation, by continually pressing the UP (or DOWN) button, the entries will increment (or decrement) by about 12 per second (roughly 1 hour intervals).

Once an entry has been selected, the bottom line of the display will show the time and date the entry was logged (see above left example), then, after a few seconds, will display the output voltage and output current reading that was logged (see above right example).

12.1.5 Event log Menu

```
005:SYSTEM      BOOT
01:00:01  01Jan 10
```

```
005:SYSTEM      BOOT
U=12.8V:  I= 0.1A
```

This menu will initially display 'LOG START'.

Pressing the UP button, the periodic log entries can be displayed, with the most recent entry being displayed first. 'LOG END' will be displayed when the other end of the log is reached.

The periodic log can display the event entries that have been logged whenever an event of significance occurs. Up to 100 events are logged. To assist with navigation through the log, the UP (or DOWN) button may be held closed to scroll forwards (or backwards) at about 5 per second through the events viewed.

Once an entry has been selected, the bottom line of the display will show the time and date the entry was logged (see above left example), then, after a few seconds will display the output voltage and output current reading that was logged (see see above right example).

Press the ESC to return to the "[Log View Menu](#)" (Section 12.1.2)

12.1.6 Battery Information Menu

```
2.Battery Info
```

Press the UP button to select the "Battery Info" menu to view the battery status. This major menu has submenus that display the Battery Voltage and Current, Battery Temperature and estimated

capacity remaining in the battery. To view these menus press the RIGHT button successively.

Battery Voltage and Current menu – displays the Battery Voltage and Battery current. Current displayed with a "–ve" sign indicates that the battery is supplying the load and "+ve" sign indicates that the battery receiving charge.

```
Vx =    12.8V
Ix =    -0.3A
```

Battery Temperature menu – displays the battery temperature in degrees Celsius.

```
Battery Temp.:
20.3C
```

Battery capacity Remaining menu – displays the estimated battery capacity remaining. Press the ESC button to return to the “Battery Info” menu. While in any of these submenus, the UP and DOWN buttons have no effect, the LEFT button changes to the previous menu. Press the LEFT or the ESC button to return to “**Battery Info**” menu.

```
Battery Level:
78% full
```

12.1.7 Output Information Menu

Press the UP button to select the “Output Info” menu to view the output status of the UPS. This major menu has submenus that display the Output Voltage and Current, Timer, and Remaining time that the UPS will run for. These submenus can be accessed by pressing the RIGHT button.

```
3.Output      Info
Output is ON
```

Output Voltage and current menu – displays the output voltage and current of the UPS.

```
U =   15.10 V
I =    1.00 A
```

Timer menu displays the remaining time that the UPS output will run for. The output will be switched off once this timer reaches 0:00:00. Press the LEFT button or ESC to return to “Output Info” menu.

```
OP   Timer   Running
3:12:17 rem.
```

12.1.8 UPS Information Menu

Press the UP button to select the “UPS Info” menu to view the status of the digital inputs and the relay outputs.

```
4.UPS Info
```

These menus can be viewed by pressing the RIGHT button. The first press on the RIGHT button will show the digital input-1 and its state (HIGH or LOW), and further successive presses will show the digital inputs “-2 and 3”. Further successive presses on the RIGHT button will show the Relays “-1, 2 and 3” along with their state and configuration (driving source). An example of each is shown immediately following:

Digital Input-1: The top line displays the digital input number and bottom line displays its state HIGH/LOW.

```
Digital Input 1:
LOW
```

Relay 1: The top line displays Relay number and its state OPEN/CLOSE, the bottom line displays its driving source, as configured in the “Configuration menu”. Press ESC button to return to “**UPS Info**” menu.

```
Relay 1: OPEN
Digital Input
```

12.1.9 Communications Information Menu

Press the UP button to select the "Comms. Info" menu to view the Modbus communications port settings. This major menu also displays if the Modbus port has been switched ON (by setting the address to non-zero).

```
5.Comms. Info
Modbus Port:ON
```

Pressing the RIGHT button progresses the display through the Modbus address and the communications settings. An example is shown immediately following. Press the ESC button to return to the "Comms. Info" menu.

```
MB Slave Adr: 1
Set: 9600:E:8:1
```

13 Field Configuration Menu Structure

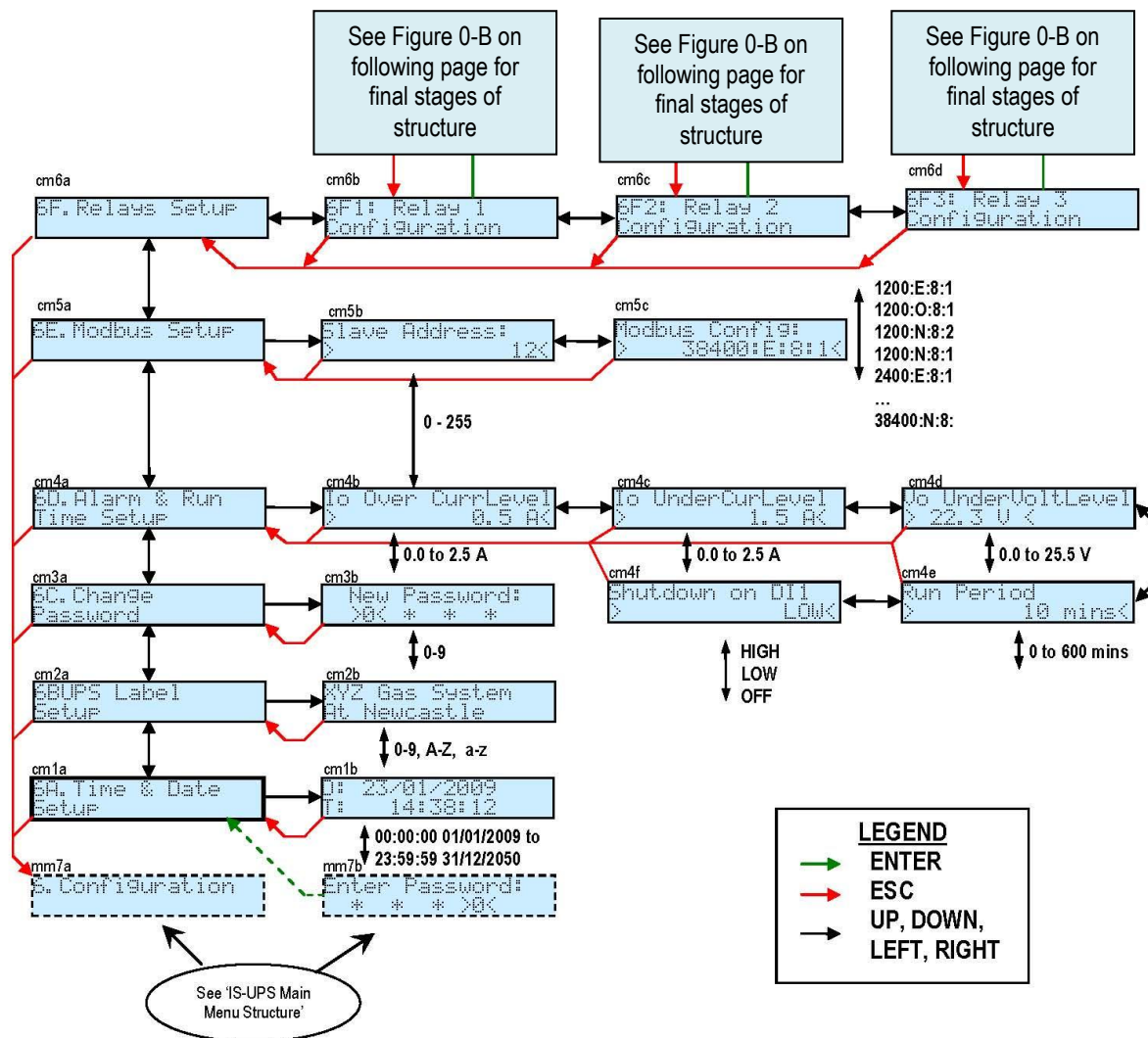


Figure 13-A – Field Configuration Menu – Initial Stages

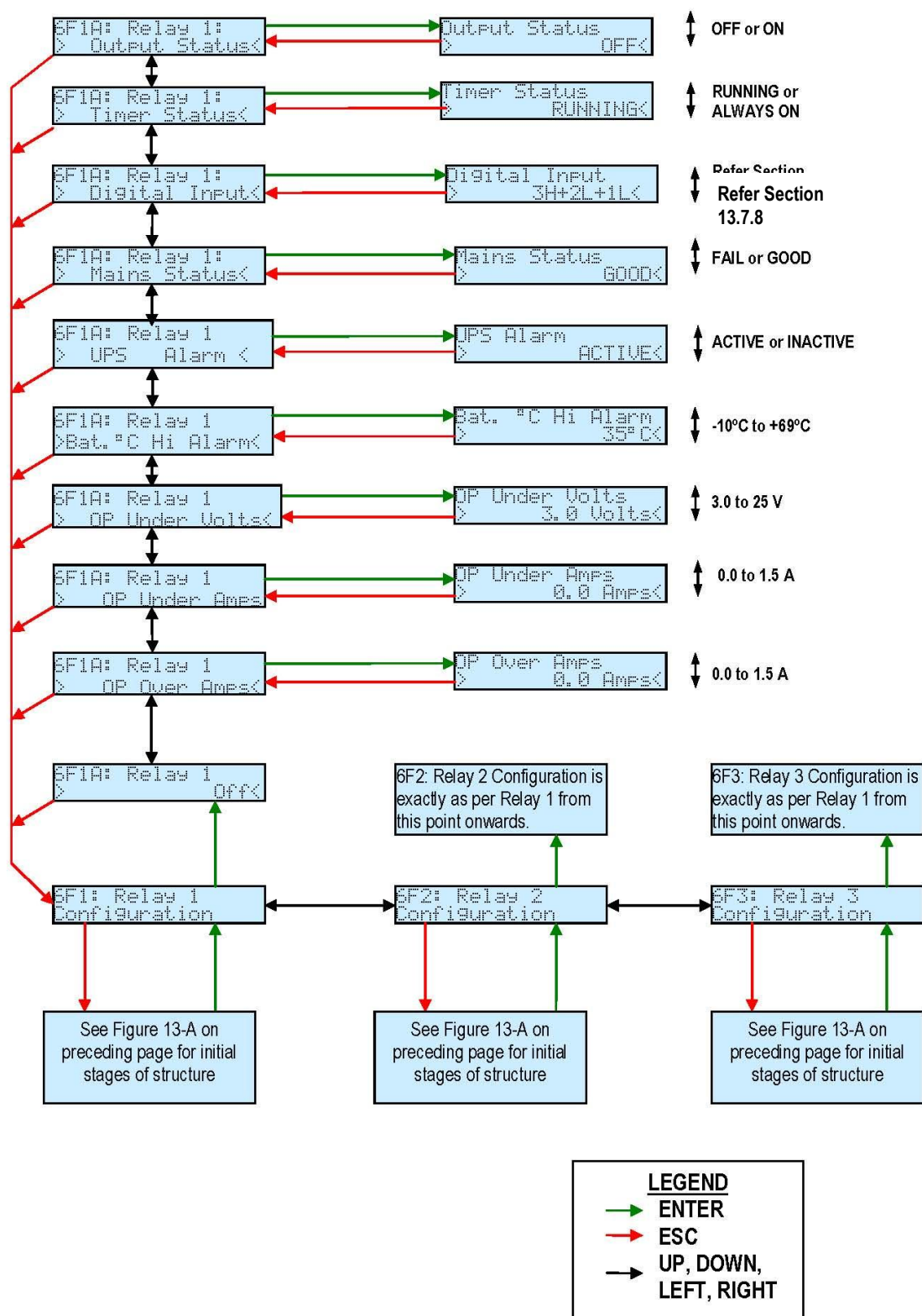


Figure 13-B – Field Configuration Menu – Final Stages

13.1 Configuration Menu

Press the UP button to select the “Configuration” menu. This menu can be used to View and Modify or change the configuration settings. To gain access to the configuration menus, a valid password must first be entered.

6. Configuration

Pressing the RIGHT or ENTER button progresses the display to show the Password entry menu. An example is shown below:

Enter Password:
>0< * * *

Selection of the first digit of the password is done by progressive pressing of the UP and/or DOWN button. Pressing the RIGHT button will move to the next digit. Pressing the LEFT button will move to the preceding digit.

Once the four password digits have been entered, pressing the ENTER button will display the ‘6A: Time and Date Setup’ if the password is correct. If the password is not correct the cursor will return to the left-most digit of the password entry display. After all the password entry digits are cleared, the password can be re-entered.

Press the LEFT button to move back to the previous digit or, if in the left-most digit, the previous menu.



The correct password must be entered to gain access to the configuration menus. The factory default password is set to ‘0000’ (four zeros).

To prevent unsolicited tampering with the configuration settings, it is recommended that the password be changed once the configuration is completed.

CAUTION!



Be sure to set the new password to a value that is easily remembered because access cannot be gained to the configuration settings without the password.

A lost or forgotten password will require resetting the password to the factory setting before a new password can be set. The password can be reset by selecting the “F4.Password Reset” menu from the [Factory Configuration Menu](#) (Section 14).

Refer to Section 13.4 for the [Password Management Menu](#).

The “Configuration” menu has 6-submajor menus which allow access to change the settings belonging to these categories.

To gain access to the major sub menus, press the UP button; while in any of the major submenus, pressing the RIGHT button will open the submenu and the settings can be changed here.

13.2 Time and Date Menu – 1st Major Sub-Me

```
6A: Time & Date
Setup
```

Press the UP button to gain access to this menu. This is the first major submenu. To change the settings in it, press the RIGHT button and it will provide the editable menu.

13.2.1 Time and Date Setup Menu

```
D: 01/01/2008
T: 14:33:18
```

This menu allows entry of the current date and time. The element (day, month, year, hour minute or second) of date/time that is active for modification is indicated with a flashing block ('█'). The value of the element can be increased or decreased in value using the UP or DOWN buttons. Selection of the elements can be done using the LEFT and RIGHT buttons. Press the ENTER button to save the changes. Press the ESC button to return to the [Time and Date Setup Menu](#) (1st Major Sub-menu).



When the UPS is initially powered on, a default time and date is set to ensure that logging of events will occur. The default date is 1 January 2009, and time of 1:00:00 is set (See Below).

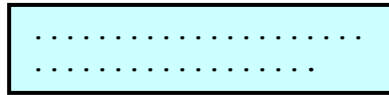
```
D: 01/01/2009
T: 01:00:00
```

13.3 User Defined Label – 2nd Major Sub-Menu

```
6B.UPS Label
Setup
```

Press the UP button to access this menu. A user definable label to be given to this UPS is entered here. Normally, information that is relevant to the user regarding the installation of the UPS is entered at this menu. This information is displayed on the Main Status sub-menu. Press the RIGHT button to access the editable menu.

13.3.1 UPS Label Setup Menu

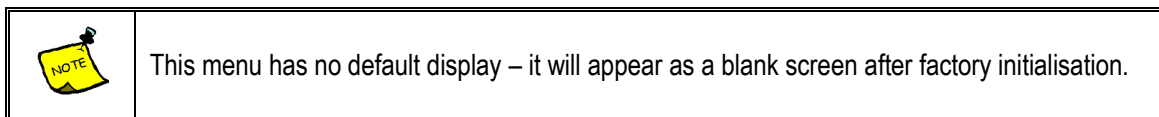


Upon entry to this menu, a flashing block will appear in the upper left corner. The UP or DOWN button can be pressed to select the desired character for the position of this label. A single press of the UP button will select the next character/digit; conversely a single press of the DOWN button will select the previous character/digit. If either the UP or DOWN buttons are pressed, then rapid progression of the next or previous characters will be selected.

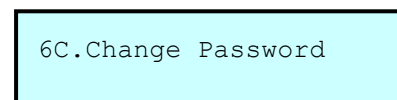
The RIGHT button will allow the next character in the label to be selected for editing. Successive presses of the RIGHT button will move the block to the last character of the bottom line, then an additional press of the RIGHT button will move focus to the top left of the menu.

The LEFT button will allow either the previous character to be selected for editing; except if the block is already in the upper-left corner of the display, the last character will be moved into focus.

The ENTER button saves the setting into memory. Press the ESC button to return to the [User Defined Label Menu](#) (2nd Major Sub-menu).

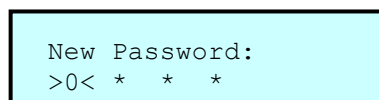


13.4 Password Management Menu – 3rd Major Sub-Menu



Press the UP button to access the Password Management Menu. Under this menu there is an editable menu that will allow the operator to enter the new password. To enter, press the RIGHT button.

13.4.1 Password Change Menu



The Password Change Menu allows the user to change the configuration menu entry password.

Pressing the UP or DOWN buttons will change the password digit with the focus up or down, respectively. Pressing the RIGHT button will move the focus to the next digit. The LEFT button will move the focus to the preceding digit, providing that it is not the first digit (left-most digit). If the focus is on the first digit, and the LEFT button is pressed, then it will move the focus to the last digit.

The ENTER button saves the setting into memory. Press the ESC button to return to the [Password Management Menu](#) (3rd Major Sub-menu).

13.5 UPS Output (Alarm & Run Time) Menu-4th Major Sub-Menu

```
6D.Alarm & Run
Time Setup
```

Press the UP button to access this menu. This major sub menu allows the viewing and setting of various UPS parameters, as follows:

- The output over-current level
- The output under-current level,
- The output under voltage level,
- Run time and
- Shutdown on DI1

13.5.1 Output Over-Current Level Menu

```
OP OverCurrLevel
> 1.0 A <
```

Press the RIGHT button to access to this menu. This menu allows entry of the level of current that will result in the Output Over-current alarm being activated. The UP/ DOWN button increments/decrements the setting in 0.1 Amp intervals. The minimum setting is 0.0 Amps, the maximum is 2.5 Amps. Default setting 0.4A; Hysteresis is 20% of the current limit from [Table 8](#).

The RIGHT button progresses to the next menu.

The LEFT button returns to the previous menu.

The ENTER button saves the setting into memory.

13.5.2 Output Under-Current Level Menu

```
OP UnderCurrLevel
> 0.7 A <
```

Press the RIGHT button to access to this menu. This menu allows entry of the level of current that will result in the Output Undercurrent alarm being set. The UP/DOWN button increments/decrements the setting in 0.1 Amp intervals. The minimum setting is 0.0 Amps, the maximum being 2.5 Amps. Default setting 0.0A; Hysteresis is 20% of the current limit from [Table 8](#).

The RIGHT button progresses to the next menu.

The LEFT button returns to the previous menu.

The ENTER button saves the setting into memory.

13.5.3 Output Under-Volts Level Menu

```
OP UnderVoltLevel  
> 07.7 V <
```

Press the RIGHT button to access to this menu. This menu allows entry of the level of voltage that will result in the Output under Voltage alarm being set. The UP/DOWN button increments/decrements the setting in 0.1 Volt intervals. The minimum setting is 0.0 Volts, the maximum being 25.5 Volts. Default setting 1.8 V; Hysteresis is 20% of the voltage limit from [Table 8](#).

The RIGHT button progresses to the next menu.

The LEFT button returns to the previous menu.

The ENTER button saves the setting into memory.

13.5.4 Run Period Menu

```
Run Period  
> 500 minutes <
```

Press the RIGHT button to access this menu. This menu allows selection of how long the UPS will provide output (without mains power), in 10 minute intervals. Setting can be from 0 minutes through to a maximum of 600 minutes (10 hours) or 'ALWAYS ON' using the UP/DOWN buttons. In the 'ALWAYS ON' mode the timer is deactivated and the UPS will continue to run until the battery low voltage is reached and the UPS shutdown. The run time is only active while UPS is running from Battery. If the UPS is stopped because it has exceeded the run time or low battery voltage and the mains power is returned, the UPS will start and remain running with the run time counter disabled. The UPS cannot be started while the "RESET LED" is flashing (this only happens when UPS is stopped by pressing the keypad Stop button). This means it is in lock mode and needs to be reset by pressing the keypad Reset button before any start command can be given. Default setting is 'ALWAYS ON'

The RIGHT button progresses to the next menu.

The LEFT button will return to the previous menu.

The ENTER button saves the setting into memory.

13.5.5 Shutdown on DI1 Menu

```
Shutdown on DI1
>                HIGH<
```

Press the RIGHT button to access to this menu. This menu allows selection of whether the UPS will shutdown from Digital Input-1. The available options are OFF, HIGH or LOW. For example, when set to OFF, no action will be taken when Digital Input-1 changes state. If set to HIGH, then the UPS will shut down when Digital Input-1 changes to a high state. If set to LOW, the UPS will shut down when Digital Input-1 changes to a low state.

CAUTION!



This feature only operates when the UPS is in Battery mode and it can only be used to shut down the UPS.

To enable restart; Digital Input-1 must be in a high state if set to LOW and in a low state if set to HIGH. The local start button or an external start button from the terminal board may then be used to restart the UPS.

Switching mains power on after a shutdown caused by DI1 will start the UPS but if the mains power is disconnected the UPS will shut down again. To fully utilise the IS UPS ensure that the actual DI1 is opposite to the screen setting (in a high state if set to LOW and in a low state if set to HIGH) before the mains is applied. Default setting is OFF.

The RIGHT button has no effect.

The LEFT button will return to the previous menu.

The ENTER button saves the setting into memory.

Press the ESC button to return to **UPS Outlet Menu** (4th Major Sub-menu).

WARNING!



Once this setting has been saved to memory, it will be acted upon immediately and may cause the UPS to shut down in a 'locked out' state. For example: If DI1 state is currently HIGH, and the setting is changed to HIGH and saved to memory, the UPS will shut down immediately and remain shut down until DI1 goes to the LOW state and a "Start" command is issued.

13.6 Modbus Configuration View and Modify Menu-5th Major Sub-Menu

To activate the RS485 communication it needs a safe PSU with the following specifications: Voltage Rating: 12V min & 16.5V max; Current Rating: 0.05A min & 2.8A max.

```
6E.Modbus Setup
```

Press the UP button to access this menu. The Modbus Configuration, View and Modify major menu allows the editing of the Modbus port settings. It has two submenus which may be accessed by pressing the RIGHT button.

Pressing the RIGHT button progresses the display to show the Modbus Slave Address Menu.

Pressing the UP button returns to the Relay Configuration Modify Menu.

Pressing the DOWN or LEFT button has no effect.

13.6.1 Modbus Slave Address Menu

```
Slave Addr:
>          1<
```

Press the RIGHT button to access to this menu. This menu allows selection of the slave address of the device. The selection of address 0 will switch the Modbus communications OFF; any other address will cause the unit to respond to messages of the same address. By default, address 1 is selected.

Pressing the ENTER button saves the setting into memory.

13.6.2 Modbus Configuration Menu

```
Modbus Config:
> 9600:E:8:1<
```

Press the RIGHT button to access to this menu. This menu allows selection of the baud rate, parity and stop bits for the Modbus communications. Note that the data format is fixed to 8 bits, and therefore is not selectable.

Selection is made by multiple presses of the UP or DOWN buttons. The possible settings are as in Table 13.6.2, following.

The RIGHT button has no effect.

The LEFT button returns to the previous menu.

The ENTER button saves the setting into memory. Press the ESC button to return to **Modbus Configuration View and Modify Menu** (5th Major Sub-menu).

Baud	Parity	Bits	Stop
1200	E	8	1
1200	O	8	1
1200	N	8	2
1200	N	8	1
2400	E	8	1
2400	E	8	2
2400	O	8	1
2400	N	8	2
2400	N	8	1
4800	E	8	1
4800	O	8	1
4800	N	8	2
4800	N	8	1
9600	E	8	1
9600	O	8	1
9600	N	8	2
9600	N	8	1
19200	E	8	1
19200	O	8	1
19200	N	8	2
19200	N	8	1

13.7 Relay Configuration Modify Menu-6th Major Sub-Menu

6F.Relay Setup

Press the UP button to access this menu. This major sub menu allows the viewing and setting of the Relay driving source and the level of the parameter at which it will activate the relay. Progressive pressing on the RIGHT button will access the configuration menu for Relay 1, 2 or 3 (See note below).



The procedures and illustrations applicable to Relay 1 are discussed in this section but the method of configuration is the same for all 3 relays once the appropriate relay configuration menu has been selected.

13.7.1 Relay Configuration menu

```
6F1.Relay 1
Configuration
```

Press the RIGHT button to access this menu. When in this menu press the ENTER button to access the source selection menu to select the relay driving source. One of the ten sources in Table 13.7.2 can be selected as the relay driving source by pressing the UP or DOWN buttons. Once the driving source is selected, press the ENTER button to access the editable menu for the selected source parameter. The value may then be set by pressing the UP/DOWN (increase/decrease) buttons. Press ENTER again to save the settings. The default setting for all three relays is 'OFF'

13.7.2 Configure Relay 1 using "Output Under-Volt" Menu

The following example shows the selection of 'Output Under-Voltage' as the driving source for Relay-1 and its parameter value set to 10V, at which point it will activate the Relay-1. While in the "6F1.Relay 1 Configuration" menu, press the ENTER button, then progressively press the UP button until it displays 'Output Under Volt' in the bottom line on the display – then press the ENTER button again to open the source parameter editable menu. Here enter '10V' by pressing the UP/DOWN (increase/decrease) button, then press the ENTER button to save these settings. After these steps are completed, the Relay-1 will be activated whenever the output volts fall below 10V. The configurable minimum and maximum values are 0.0V & 25.5V respectively. Hysteresis is 20% of the voltage limit from [Table 8](#).

Press the ESC button to return to the [Relay Configuration Modify Menu](#) (6th Major Sub-menu).

Relay Source Selection Menu

```
6F1A: Relay 1
>OP Under Volts<
```

Output Under-Volts Selection Menu

```
OP Under Volts
> 10Volt<
```

SN	Available Relay driving Source
1	Off
2	Output Over Current (OP Over Amps)
3	Output Under Current (OP Under Amps)
4	Output Under Voltage (OP Under Volts)
5	Battery Temperature Alarm (Bat. °C Hi Alarm)
6	UPS Alarm (UPS Alarm)
7	Mains Status (Mains Status)
8	Digital Input (Digital Input)
9	Timer Status (Timer Status)
10	Output Status (Output Status)

Table 13.7.2 - List of Relay Driving Sources

13.7.3 Configure Relay 1 using 'Output Over-Current' Menu

While in the "6F1.Relay 1 Configuration" menu, press the ENTER button, then progressively press the UP button until it displays 'OP Over Amps' in the bottom line on the display – then press the ENTER button again to open the source parameter editable menu. Here enter '0.40A' by pressing UP/DOWN (increase/decrease) buttons, then press the ENTER button once again, to save these settings. After these steps are completed, the Relay-1 will be activated whenever the output current rises above 0.40A. The configurable minimum and maximum values are 0.0A & 2.5A. Hysteresis is 20% of the current limit from [Table 8](#).

Press the ESC button to return to the [Relay Configuration Modify Menu](#).

Relay Output-Over Current Menu

```
6F1A:Relay 1
> OP Over Amps<
```

Output Over-Current Setting menu

```
OP Over Amps
> 0.40 Amps <
```

13.7.4 Configure Relay 1 using 'Output Under-Current' Menu

While in the "6F1.Relay 1 Configuration" menu, press the ENTER button, then progressively press the UP button until it displays 'Output Under Current' in the bottom line on the display – then press the ENTER button again to open the source parameter editable menu. Here enter '0.30A' by pressing the UP/DOWN (increase/decrease) buttons, then press the ENTER button once again, to save these settings. After these steps are completed the Relay-1 will be activated whenever the output current drops under 0.30A. The configurable minimum and maximum values are 0.0A & 2.5A. Hysteresis is 20% of the current limit from [Table 8](#).

Press the ESC button to return to the [Relay Configuration Modify Menu](#).

Relay Output Under-Current Menu

```
6F1A:Relay 1
> OP Under Amps<
```

Output Under-Current Setting menu

```
OP Under Amps
> 0.3 Amps <
```

13.7.5 Configure Relay 1 using 'Battery Temperature Alarm' Menu

While in the "6F1.Relay 1 Configuration" menu, press the ENTER button, then progressively press the UP button until it displays 'Bat °C Hi Alarm' in the bottom line on the display – then press the ENTER button again to open the source parameter editable menu. Here enter '45 °C' by pressing the UP/DOWN (increase/decrease) buttons until the required value is displayed, then press the ENTER button once again, to save these settings. After these steps are completed, the Relay-1 will be activated whenever the Battery temperature reaches to 45degC. The minimum setting is -10°C; the maximum setting being +69°C. After the relay activates, the relay will de-energise once the Temperature has fallen 1°C below the setting.

Press the ESC button to return to the [Relay Configuration Modify Menu](#).

Relay Battery Temperature Alarm Menu

```
6F1A:Relay 1
>Bat. °C Hi Alrm<
```

Battery Temperature Setting Menu

```
Bat. °C Hi Alarm:
> 45 °C <
```

13.7.6 Configure Relay 1 using 'UPS Alarm' Menu

While in the "6F1.Relay 1 Configuration" menu, press the ENTER button, then progressively press the UP button until it displays 'UPS Alarm' in the bottom line on the display – then press the ENTER to access the editable menu, press the UP button to select 'Active/Inactive' then press ENTER to save the settings. If the 'Active' is selected, the Relay-1 will be activated when any of the UPS alarms situation arises. These alarms settings are in the **6D.Alarm and Run Time Setup** menu.

Pressing the ESC button returns to the **Relay Configuration Modify Menu**.

Relay x UPS Alarm Menu

```
6F1A:Relay 1
>      UPS Alarm<
```

UPS Alarm Setting Menu

```
UPS Alarm
>      ACTIVE<
```

13.7.7 Configure Relay 1 using 'Mains Status' Menu

While in the "6F1.Relay 1 Configuration" menu, press the ENTER button, then progressively press the UP button until it displays 'Mains Status' in the bottom line on the display – then press the ENTER button again to open the source parameter editable menu. Here enter 'FAIL/GOOD' by pressing the UP/DOWN buttons, then press the ENTER button once again, to save these settings. If 'FAIL' is selected, the Relay-1 will be activated whenever the Mains fail. If 'GOOD' is selected the Relay-1 will be activated whenever the mains is ON

Press the ESC button to return to the **Relay Configuration Modify Menu**.

Relay x Mains Status Menu

```
6F1A:Relay 1
>      Mains Status<
```

Mains Supply Setting Menu

```
Mains Status
>      FAIL<
```

13.7.8 Configure Relay 1 using 'Digital Input' Menu

While in the "6F1.Relay 1 Configuration" menu, press the ENTER button, then progressively press the UP button until it displays 'Digital Input' in the bottom line on the display – then press the ENTER button again to open the source parameter editable menu. Here enter '3H 2L 1L' by pressing the UP/DOWN buttons, then press the ENTER button once again, to save these settings. After these steps are completed, the Relay-1 will be activated whenever the three Digital Inputs match the set up. See Table 13.7.8 '[Available Digital Input setting list](#)' following for various options of setting.

Pressing the ESC button returns to the [Relay Configuration Modify Menu](#).

Relay Digital Input Menu

```
6F1A:Relay 1  
> Digital Input<
```

Digital Input Setting Menu

```
Digital Input  
> 3H+2L+1L<
```

Index	Digital Input-1 Non-Isolated	Digital Input-2 Isolated	Digital Input-3 Isolated
1	IGNORED	IGNORED	IGNORED
2	IGNORED	IGNORED	LOW
3	IGNORED	IGNORED	HIGH
4	IGNORED	LOW	IGNORED
5	IGNORED	LOW	LOW
6	IGNORED	LOW	HIGH
7	IGNORED	HIGH	IGNORED
8	IGNORED	HIGH	LOW
9	IGNORED	HIGH	HIGH
10	LOW	IGNORED	IGNORED
11	LOW	IGNORED	LOW
12	LOW	IGNORED	HIGH
13	LOW	LOW	IGNORED
14	LOW	LOW	LOW
15	LOW	LOW	HIGH
16	LOW	HIGH	IGNORED
17	LOW	HIGH	LOW
18	LOW	HIGH	HIGH
19	HIGH	IGNORED	IGNORED
20	HIGH	IGNORED	LOW
21	HIGH	IGNORED	HIGH
22	HIGH	LOW	IGNORED
23	HIGH	LOW	LOW
24	HIGH	LOW	HIGH
25	HIGH	HIGH	IGNORED
26	HIGH	HIGH	LOW
27	HIGH	HIGH	HIGH

Table 13.7.8 - Available Digital Input setting list

13.7.9 Configure Relay 1 using 'Timer Status' Menu

While in the "6F1.Relay 1 Configuration" menu, press the ENTER button, then progressively press the UP button until it displays 'Timer Status' in the bottom line of the display – then press the ENTER button again to open the source parameter editable menu. Here enter 'RUNNING/ALWAYS ON' by pressing the UP/DOWN buttons, then press the ENTER button once again, to save these settings. If 'RUNNING' is selected, the Relay-1 will be activated when the UPS is running from the battery **and** the timer is running (Refer Section 13.5.4 [Run Period Menu](#)). If 'ALWAYS ON' is selected, the Relay-1 will be activated if the timer is set to 'ALWAYS ON'.

Pressing the ESC button returns to the [Relay Configuration Modify Menu](#).

Relay Timer Status Menu

```
6F1A:Relay 1  
> Timer Status<
```

Timer Status Setting Menu

```
Timer Status  
> ON<
```

13.7.10 Configure Relay 1 using 'Output Status' Menu

The Relay-1 Output Status Setting Menu allows selection of when the output has been enabled will activate Relay-1. While in the "6F1.Relay 1 Configuration" menu, press the ENTER button, then progressively press the UP button until it displays 'Output Status' in the bottom line on the display – then press the ENTER button again to open the source parameter editable menu. Here enter 'ON/OFF' by pressing the UP/DOWN buttons, then press the ENTER button to save these settings. If 'ON' is selected, the Relay-1 will be activated when the Output is enabled ON. If 'OFF' is selected, the Relay-1 will be activated when the Output turns off.

Pressing the ESC button returns to the [Relay Configuration Modify Menu](#).

Relay Output Status Menu

```
6F1A:Relay 1  
> Output Status<
```

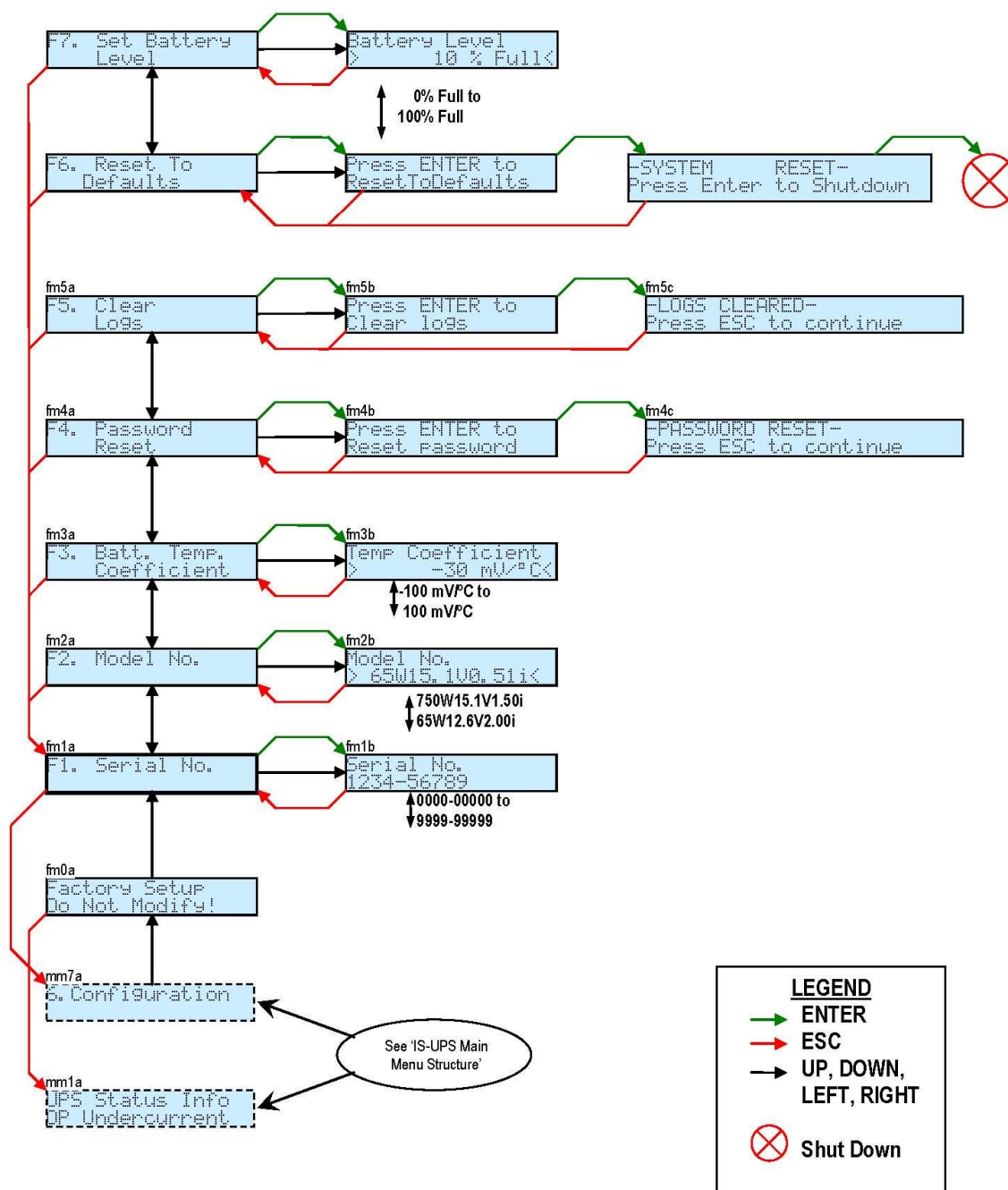
Output Status Setting Menu

```
Output Status  
> ON<
```

Relay Off Menu

```
6F1A:Relay 1  
> Off<
```

14 Factory Configuration menu



14.1 Factory Settings Access

To gain access to the Factory Settings menu a specific key sequence must be entered when the 'Configuration Menu' is displayed. The sequence needed is UP-UP-DOWN-DOWN-LEFT-RIGHT-LEFT-RIGHT-ENTER. If this key sequence is not entered in the exact order, then access shall not be granted to the factory settings. The factory settings are intended for factory configuration only and are not meant as general purpose settings.

15 Modbus and Memory Map

A two wire RS485 interface is provided to allow Modbus Master to query the UPS using RTU Modbus protocol. The various Modbus registers exposed by the device are shown in the Memory Map section following. The RS485 configuration is shown in the [Modbus Configuration Menu](#) in Section 13.6.2, previous. An external 12 V dc power is required to enable the RS485 communications.

15.1 Memory Map

15.1.1 Discreet outputs (0X References)			
Bit Address	Name	Comment	Modbus Functions Supported
1	Mains Status	0 = Off, 1 = On	Read Coil Status(0X01)
2	Output Status	0 = Off, 1 = On	Read Coil Status(0X01)
3	Modbus Status	0 = Off, 1 = On	Read Coil Status(0X01)
4	Relay 1	0 = Off, 1 = On	Read Coil Status(0X01), Write Single Coil(0X05)
5	Relay 2	0 = Off, 1 = On	Read Coil Status(0X01), Write Single Coil(0X05)
6	Relay 3	0 = Off, 1 = On	Read Coil Status(0X01), Write Single Coil(0X05)
7	Reserved		
8	Reserved		
9	Up Button	1 = Pressed	Read Coil Status(0X01), Write Single Coil(0X05)
10	Down Button	1 = Pressed	Read Coil Status(0X01), Write Single Coil(0X05)
11	Left Button	1 = Pressed	Read Coil Status(0X01), Write Single Coil(0X05)
12	Right Button	1 = Pressed	Read Coil Status(0X01), Write Single Coil(0X05)
13	ESC Button	1 = Pressed	Read Coil Status(0X01), Write Single Coil(0X05)
14	ENTER Button	1 = Pressed	Read Coil Status(0X01), Write Single Coil(0X05)
15	START Button	0 = Pressed	Read Coil Status(0X01), Write Single Coil(0X05)
16	STOP Button	1 = Pressed	Read Coil Status(0X01), Write Single Coil(0X05)
17	Reserved		
18	Reserved		
19	Reserved		
20	Reserved		
21	Digital Input 1	0 = Low, 1 = High	Read Coil Status(0X01)
22	Digital Input 2	0 = Low, 1 = High	Read Coil Status(0X01)
23	Digital Input 3	0 = Low, 1 = High	Read Coil Status(0X01)
24	Reserved		
25	Overload Current Sense 1	OLC1 Input	Read Coil Status(0X01)
26	Overload Current Sense 2	OLC2 Input	Read Coil Status(0X01)
27	Overload Current Sense 3	OLC3 Input	Read Coil Status(0X01)
28	Reserved		
29	Latched Overload Current Sense 1	OLC1 Latch	Read Coil Status(0X01)

15.1.1 Discreet outputs (0X References)			
Bit Address	Name	Comment	Modbus Functions Supported
30	Latched Overload Current Sense 2	OLC2 Latch	Read Coil Status(0X01)
31	Latched Overload Current Sense 3	OLC3 Latch	Read Coil Status(0X01)
32	Reserved		
33	Reserved		
34	Reserved		
35	Reserved		
36	Reserved		
37	Reserved		
38	Reserved		
39	Reserved		
40	Reserved		
41	Reserved		
42	Reserved		
43	Reserved		
44	Reserved		
45	Reserved		
46	Reserved		
47	Reserved		
48	Reserved		
49	Reserved		
50	Reserved		
51	Reserved		
52	Reserved		
53	Reserved		
54	Reserved		
55	Reserved		
56	Reserved		

15.1.2 Input Registers (3X References)			
Address	Register Name	Precision	Modbus Functions Supported
1	System Timer (MSW)	Seconds	Read Input Registers(0X04)
2	System Timer (LSW)		Read Input Registers(0X04)
3	Battery Temperature	°C	Read Input Registers(0X04)
4	Battery Bus Voltage	mV	Read Input Registers(0X04)
5	Mains Input Voltage	V	Read Input Registers(0X04)
6	DC Output Voltage	mV	Read Input Registers(0X04)
7	DC Output Current	mA	Read Input Registers(0X04)
8	Battery Voltage	mV	Read Input Registers(0X04)
9	Battery Discharge Current	mA	Read Input Registers(0X04)
10	Battery Charge Current	mA	Read Input Registers(0X04)

15.1.3 Holding Registers (4X References) <i>[Control Registers support read/write]</i>			
Address	Register Name	Description	Modbus Functions Supported
1	Periodic Log Index	16 bit index of the Periodic Log to show at Holding Register starting : 101	Read Holding Registers(0X03), Preset Single Register(0X06)
2	Event Log Index	16 bit index of the Event Log to show at Holding Register starting : 201	Read Holding Registers(0X03), Preset Single Register(0X06)
3	Output Toggle Timer	16 Bit timer in Seconds to activate the output toggle operation. Setting this to a value greater than 0, immediately switches the output Off. The output would come on when this timer expires.	Read Holding Registers(0X03), Preset Single Register(0X06)
4-100	Reserved		

15.1.4 Holding Registers (4X References) <i>[Periodic Log supports read only]</i>			
Address	Name	Comment	Modbus Functions Supported
101	Periodic Log Entry Index	Register Index H	Read Holding Registers(0X03)
		Register Index L	Read Holding Registers(0X03)
102	Total Periodic Log Entries	Total Log Entries H	Read Holding Registers(0X03)
		Total Log Entries L	Read Holding Registers(0X03)
103	Time	Seconds	Read Holding Registers(0X03)
		Minutes	Read Holding Registers(0X03)
104		Hours (24 Hr Format)	Read Holding Registers(0X03)
		0 (Reserved)	Read Holding Registers(0X03)
105	Date	Day (1 – 31)	Read Holding Registers(0X03)
		Month (1 -12)	Read Holding Registers(0X03)
106		Year (– 2000)	Read Holding Registers(0X03)

15.1.4 Holding Registers (4X References)		<i>[Periodic Log supports read only]</i>	
Address	Name	Comment	Modbus Functions Supported
		0 (Reserved)	Read Holding Registers(0X03)
107	Output Current (mA)	Output Current H	Read Holding Registers(0X03)
		Output Current L	Read Holding Registers(0X03)
108	Output Voltage (mV)	Output Voltage H	Read Holding Registers(0X03)
		Output Voltage L	Read Holding Registers(0X03)
109	Battery Current (mA)	Battery Current H	Read Holding Registers(0X03)
		Battery Current L	Read Holding Registers(0X03)
110	Battery Voltage (mV)	Battery Voltage H	Read Holding Registers(0X03)
		Battery Voltage L	Read Holding Registers(0X03)
111	Battery Temperature (°C)	Battery Temperature	Read Holding Registers(0X03)
	UPS Status	UPS Status	Read Holding Registers(0X03)
112-200	Reserved		

15.1.5 Holding Registers (4X References)		<i>[Event Log & LCD-Data support read only]</i>		
Address	Name	Example		Modbus Functions Supported
		Hex	ASCII	
201	Event log entry number	0x30	0	Read Holding Registers(0X03)
		0x31	1	Read Holding Registers(0X03)
202		0x37	7	Read Holding Registers(0X03)
		0x2C	,	Read Holding Registers(0X03)
203	Total event log entries	0x30	0	Read Holding Registers(0X03)
		0x39	9	Read Holding Registers(0X03)
204		0x39	9	Read Holding Registers(0X03)
		0x2C	,	Read Holding Registers(0X03)
205	Entry description	0x20		Read Holding Registers(0X03)
		0x20		Read Holding Registers(0X03)
206		0x20		Read Holding Registers(0X03)
		0x20		Read Holding Registers(0X03)
207		0x4F	O	Read Holding Registers(0X03)
		0x56	V	Read Holding Registers(0X03)
208		0x45	E	Read Holding Registers(0X03)
		0x52	R	Read Holding Registers(0X03)
209		0x20		Read Holding Registers(0X03)
		0x43	C	Read Holding Registers(0X03)
210		0x55	U	Read Holding Registers(0X03)
		0x52	R	Read Holding Registers(0X03)
211		0x52	R	Read Holding Registers(0X03)
		0x45	E	Read Holding Registers(0X03)
212		0x4E	N	Read Holding Registers(0X03)

15.1.5 Holding Registers (4X References) <i>[Event Log & LCD-Data support read only]</i>				
Address	Name	Example		Modbus Functions Supported
		Hex	ASCII	
		0x54	T	Read Holding Registers(0X03)
213		0x2C	,	Read Holding Registers(0X03)
	Output Current (Amps)	0x20		Read Holding Registers(0X03)
214		0x20		Read Holding Registers(0X03)
		0x20		Read Holding Registers(0X03)
215		0x20		Read Holding Registers(0X03)
		0x20		Read Holding Registers(0X03)
216		0x20		Read Holding Registers(0X03)
		0x20		Read Holding Registers(0X03)
217		0x20		Read Holding Registers(0X03)
		0x30	0	Read Holding Registers(0X03)
218		0x2E	.	Read Holding Registers(0X03)
		0x32	2	Read Holding Registers(0X03)
219		0x41	A	Read Holding Registers(0X03)
		0x2C	,	Read Holding Registers(0X03)
220	Output Voltage (Volts)	0x20		Read Holding Registers(0X03)
		0x20		Read Holding Registers(0X03)
221		0x20		Read Holding Registers(0X03)
		0x20		Read Holding Registers(0X03)
222		0x20		Read Holding Registers(0X03)
		0x20		Read Holding Registers(0X03)
223		0x20		Read Holding Registers(0X03)
		0x20		Read Holding Registers(0X03)
224		0x30	0	Read Holding Registers(0X03)
		0x2E	.	Read Holding Registers(0X03)
225		0x30	0	Read Holding Registers(0X03)
		0x56	V	Read Holding Registers(0X03)
226		0x2C	,	Read Holding Registers(0X03)
	Time recorded	0x30	0	Read Holding Registers(0X03)
227		0x39	9	Read Holding Registers(0X03)
		0x3A	:	Read Holding Registers(0X03)
228		0x35	5	Read Holding Registers(0X03)
		0x37	7	Read Holding Registers(0X03)
229		0x3A	:	Read Holding Registers(0X03)
		0x32	2	Read Holding Registers(0X03)
230		0x35	5	Read Holding Registers(0X03)
		0x20		Read Holding Registers(0X03)
231		0x30	0	Read Holding Registers(0X03)
		0x36	6	Read Holding Registers(0X03)

15.1.5 Holding Registers (4X References) <i>[Event Log & LCD-Data support read only]</i>				
Address	Name	Example		Modbus Functions Supported
		Hex	ASCII	
232		0x44	D	Read Holding Registers(0X03)
		0x65	e	Read Holding Registers(0X03)
233		0x63	c	Read Holding Registers(0X03)
		0x30	0	Read Holding Registers(0X03)
34		0x37	7	Read Holding Registers(0X03)
		0x0a	'\n'	Read Holding Registers(0X03)
235	Current LCD Top Line		U	Read Holding Registers(0X03)
			P	Read Holding Registers(0X03)
236			S	Read Holding Registers(0X03)
				Read Holding Registers(0X03)
237			S	Read Holding Registers(0X03)
			t	Read Holding Registers(0X03)
238			a	Read Holding Registers(0X03)
			t	Read Holding Registers(0X03)
239			u	Read Holding Registers(0X03)
			s	Read Holding Registers(0X03)
240				Read Holding Registers(0X03)
			l	Read Holding Registers(0X03)
241			n	Read Holding Registers(0X03)
			f	Read Holding Registers(0X03)
242			o	Read Holding Registers(0X03)
				Read Holding Registers(0X03)
243	LCD Bottom Line		M	Read Holding Registers(0X03)
			a	Read Holding Registers(0X03)
244			i	Read Holding Registers(0X03)
			n	Read Holding Registers(0X03)
245			s	Read Holding Registers(0X03)
			:	Read Holding Registers(0X03)
246			O	Read Holding Registers(0X03)
			F	Read Holding Registers(0X03)
247			F	Read Holding Registers(0X03)
				Read Holding Registers(0X03)
248			O	Read Holding Registers(0X03)
			P	Read Holding Registers(0X03)
249			:	Read Holding Registers(0X03)
			O	Read Holding Registers(0X03)
250			N	Read Holding Registers(0X03)
				Read Holding Registers(0X03)
251 – 300	Reserved			

15.1.6 Holding Registers (4X References) <i>[Date & Time Registers support read/write]</i>			
Address	Register Name	Description	Modbus Functions Supported
301	Seconds In BCD format	Seconds of the Time and Date in BCD format. Valid range = 0X00 to 0X59	Read Holding Registers(0X03), Preset Multiple Registers(0X10)
302	Minutes In BCD format	Minutes of the Time and Date in BCD format. Valid range = 0X00 to 0X59	Read Holding Registers(0X03), Preset Multiple Registers(0X10)
303	Hours In BCD format	Hours of the Time and Date in BCD format. Valid range = 0X00 to 0X23	Read Holding Registers(0X03), Preset Multiple Registers(0X10)
304	Date In BCD format	Date of the Time and Date in BCD format. Valid range = 0X01 to 0X31	Read Holding Registers(0X03), Preset Multiple Registers(0X10)
305	Month In BCD format	Month of the Time and Date in BCD format. Valid range = 0X01 to 0X12	Read Holding Registers(0X03), Preset Multiple Registers(0X10)
306	Year In BCD format	Year of the Time and Date in BCD format. Valid range = 0X00 to 0X99	Read Holding Registers(0X03), Preset Multiple Registers(0X10)
306-400	Reserved		

15.2 Log Reports

There are two separate logs kept in the UPS; a periodic log and an event log. These logs are accessible through the Modbus interface using the '[Read Holding Registers](#)' command as per the Memory Map previous (Section 15.1).

To set the desired log entry to be reported for a Periodic or Event log, the entry number (index) needs to be set in holding registers 1 and 2 respectively.

If a log entry is requested that does not exist in the log, then a Modbus error will be returned to the Modbus master.

15.2.1 Event Log

The Event Log contains a text representation of the log entry. The entry details that are sent are (in order), the Entry code (that is, the numeric value of the cause of the log entry), the Entry description (that is, a short text summary of the cause of the log entry), the output current, the output voltage and the date and time when the entry was logged.

Each entry detail is always the same size – it will be padded with spaces to ensure the details remain the same length. This allows the Modbus master to request sections of the string, if needed.

15.2.2 Periodic Log

The Periodic Log is reported in a raw binary manner – i.e. strings do not represent the periodic log records, but absolute raw values. The Periodic Log can hold up to 1,728 records.

15.3 Output Toggle Time

This timer can be used to toggle the output of the UPS remotely through Modbus. Setting this timer immediately turns the output of the UPS off (If the output is already off it is kept off). The timer value setting would be used to determine when to turn the output on after it was turned off. It is a read/write register and the timer count-down is visible by reading this register.

15.4 Time and Date

The system Time and Date is available in the Holding registers as per the memory map shown previously. Each of the registers; for seconds, minutes, hours, date, month and year are in BCD (Binary Coded Decimal) format. Each of these registers can be read (using Read Holding Registers (0X03)) and write can be done using Preset Multiple Registers (0X10). When the write is performed the system checks for validity and the system Time and Date is updated only if all the fields are valid.



The system only checks for upper and lower bounds and not if the date is valid. (For example: if the external system sets the month as Feb and Date as 0X31, though the date is invalid the UPS would save it as valid since 0X31 is within the bounds of 0X1 to 0X31)

16 Service, Maintenance & Disposal

16.1 Equipment Service

The IS UPS requires no internal servicing during its normal operating lifetime. A number of external system based checks should however be made on a regular basis. These 'routine inspections' must be carried out by suitably trained people with knowledge of the IS UPS and the systems into which it is fitted.

Routine inspections may take the form of either simple visual-only checks, or visual and 'hands-on' checks.

16.1.1 Visual Only Inspections

A basic visual inspection will focus on looking at the installation for signs of physical damage, water or dust ingress as well as the condition of cables and labels. This type of inspection may involve opening cabinets to gain access to the IS UPS and other equipment. This level of inspection may also include cleaning display windows that have become obscured by dirt.



NOTE: The IS UPS enclosure and display window must only be cleaned using anti-static cleaning materials. Do not clean the IS UPS with any cleaning products that may cause the build-up of static charge.

Observations would typically be:

- Check that equipment enclosures, cable trays, conduits, wall-boxes etc. are in good order with no physical damage
- Check that sealed wall-boxes are free from water and dust ingress internally. Door seals are in good condition.
- Check that connected cables are free from cuts, abrasions and obvious signs of damage. Cable restraints are in good order and correctly fitted.
- Check that labels on equipment, wall boxes and cables are present and in good clean condition (especially certification labels)
- Check that no modifications have been carried out to installed equipment.

16.1.2 Hand-On (Detailed) Inspections

A more detailed inspection would include all of the elements of a visual inspection, plus some checks that cover the integrity of connections, fixtures and fittings.

In addition to basic visual observations, more detailed integrity checks would involve:

- Verify that equipment housings, wall boxes and other mechanical fixtures are secured tightly in place. This includes the lids of terminal boxes, tightness of cable glands, integrity of wall-box mountings, security of equipment fixing to walls / DIN rails etc.
- Verify all electrical connections are secure with no loose screw terminals or DIN rail terminals not fitted to rails etc.

16.2 Equipment Maintenance

WARNING! 	The IS UPS has no user serviceable parts. All repairs must be carried out by Ampcontrol personnel only. If a fault develops return the IS UPS to Ampcontrol for repair. It is essential that no attempt be made to repair the IS UPS as any attempt to dismantle or repair the IS UPS can seriously compromise the safety of the unit and the consequence can be fatal.
--	--

The Ampcontrol IS UPS does not have any customer serviceable parts and is not provided with any user adjustments.

16.3 Disposal of System Parts

	The electronic equipment discussed in this manual must not be treated as general waste. By ensuring that this product is disposed of correctly you will be helping to prevent potentially negative consequences for the environment and human health which could otherwise be caused by incorrect waste handling of this product.
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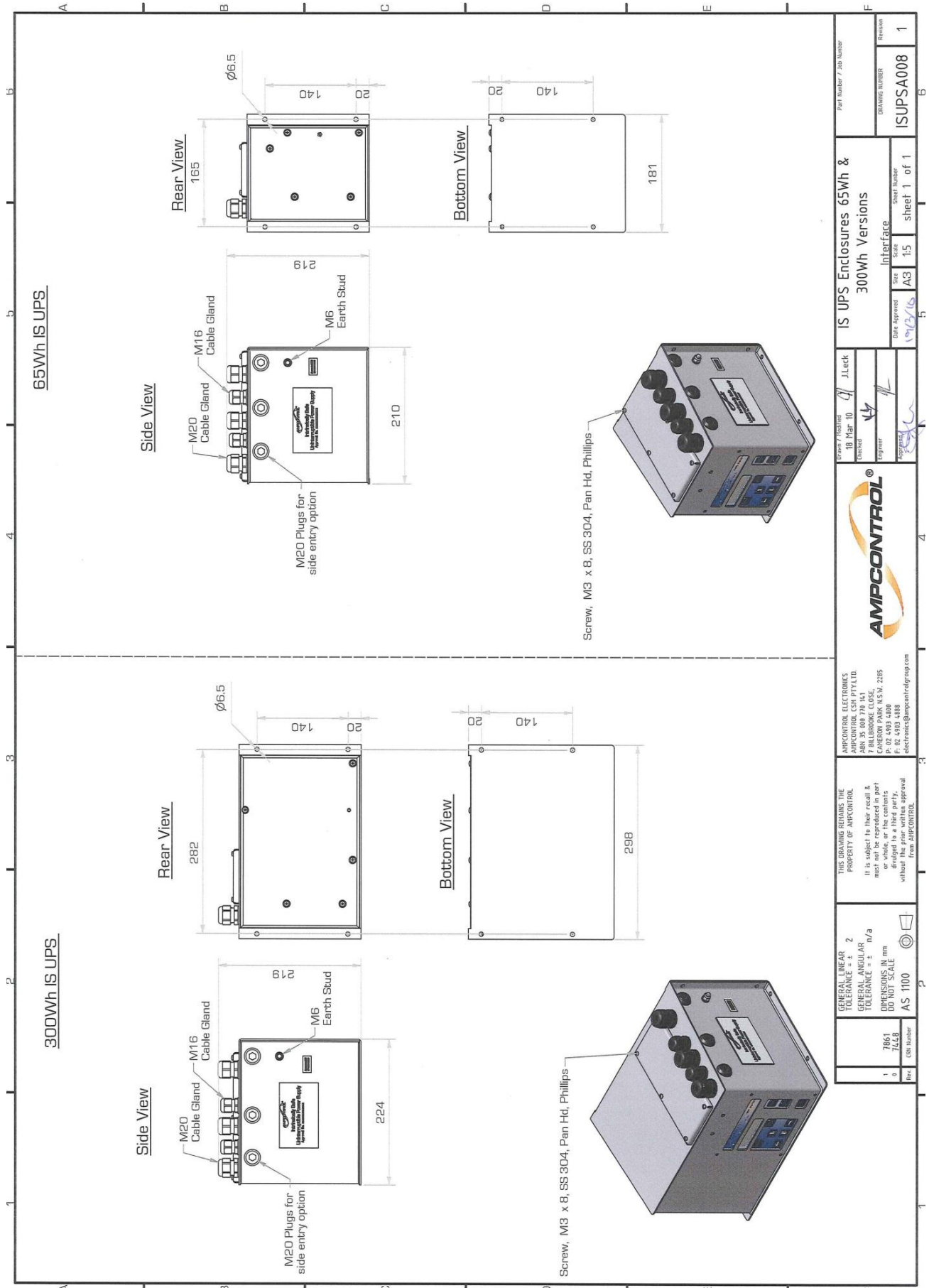
The IS UPS contains Sealed Lead Acid Batteries. Please return unwanted units to the vendor for disposal/recycling. Do not attempt to remove batteries individually or in groups, or attempt to charge/discharge batteries with other equipment.

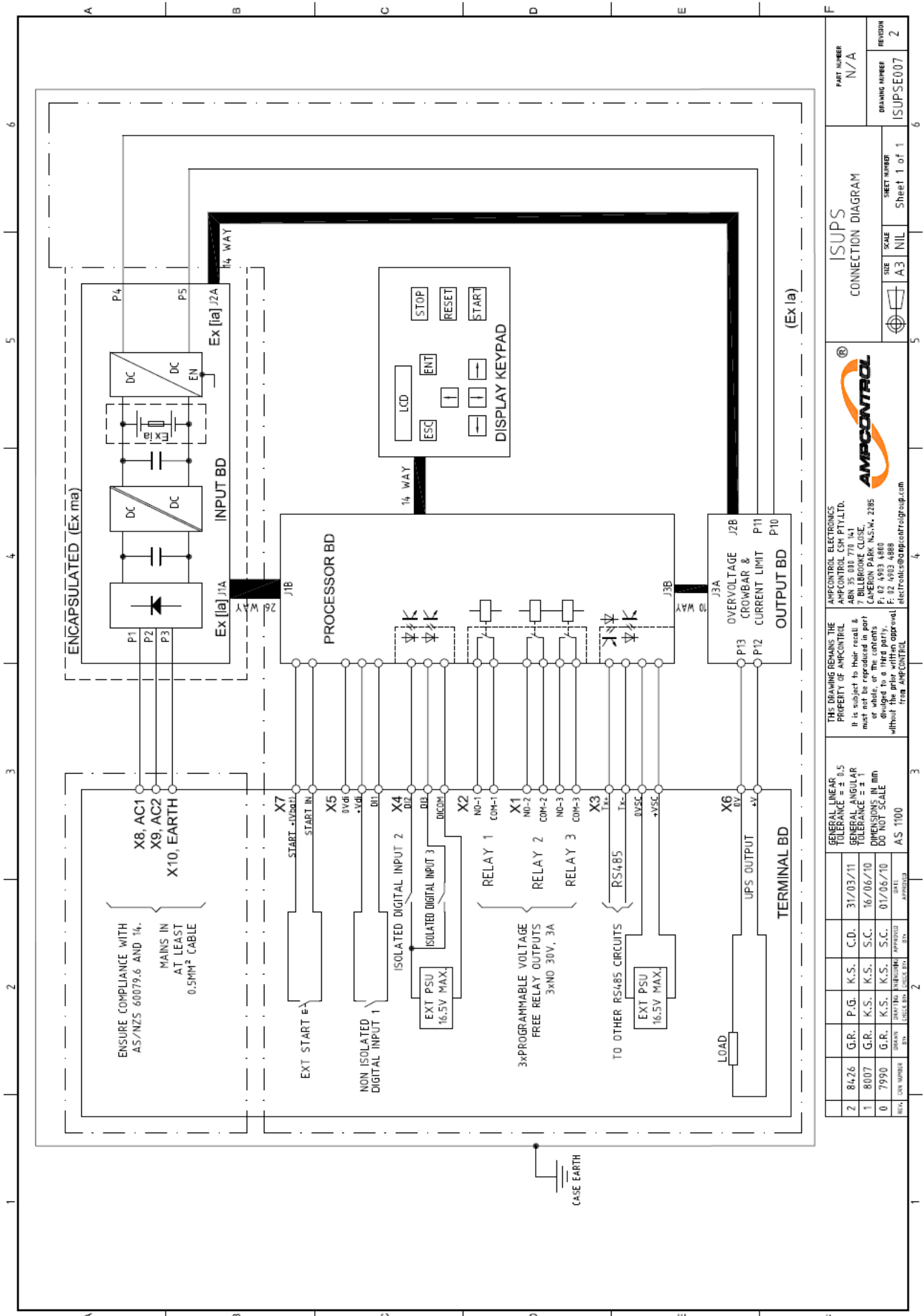
APPENDIX A - Drawings

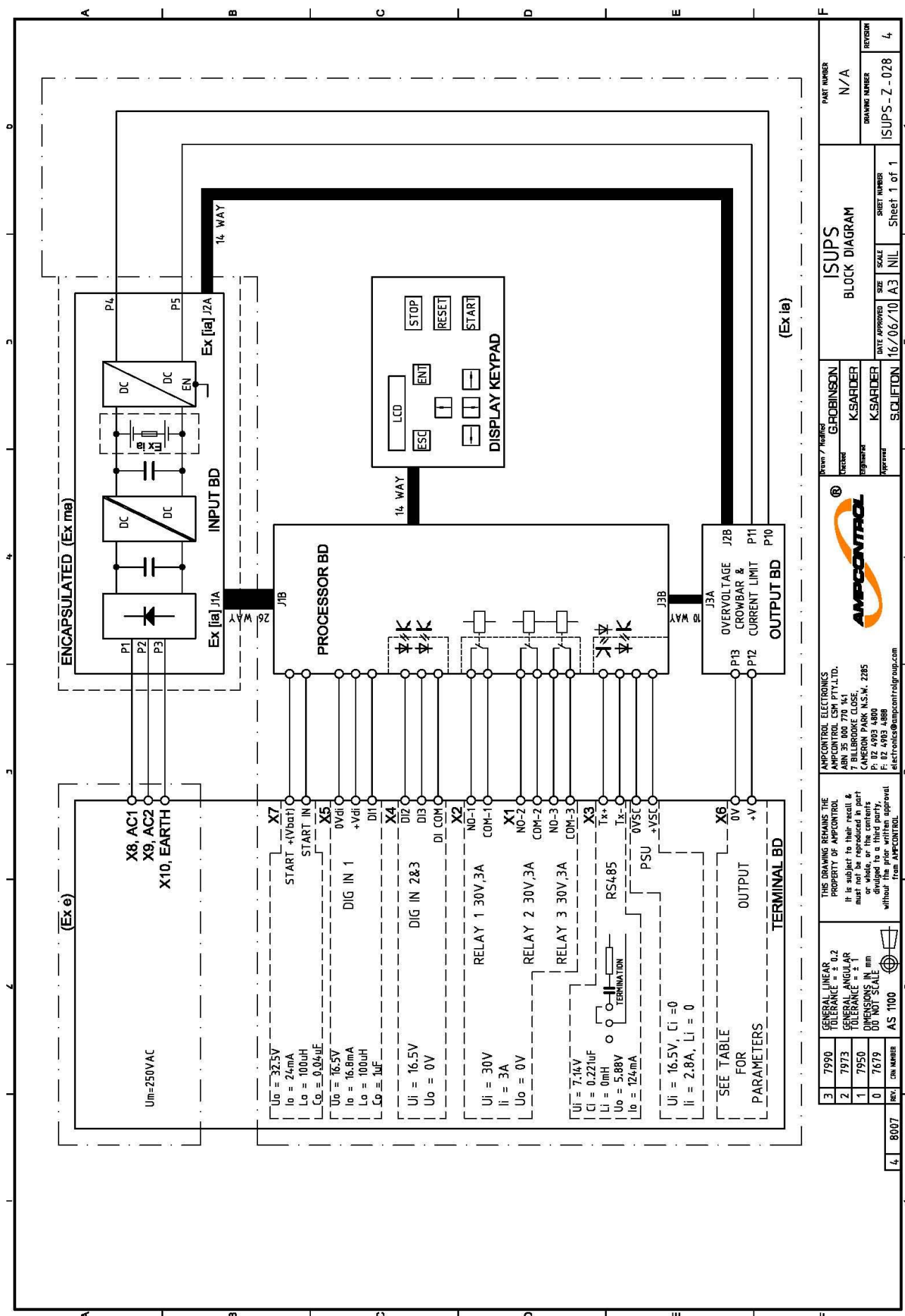
Drawing No.	Description
IS UPS A008	IS UPS Enclosures – 65Wh and 300Wh
IS UPS E007	IS UPS Connection Diagram
IS UPS Z028	IS UPS Block Diagram

The drawings appear in the following pages in the same order in which they are listed in the table above.

This list is also hyperlinked to the drawings and if reading this via a computer: holding the curser on the required drawing number whilst pressing “Control” will take the reader to that drawing.







APPENDIX B - APPROVALS

		IECEX Certificate of Conformity	
INTERNATIONAL ELECTROTECHNICAL COMMISSION IEC Certification Scheme for Explosive Atmospheres for rules and details of the IECEx Scheme visit www.iecex.com			
Certificate No.:	IECEX TSA 10.0008X	issue No.:2	Certificate history: Issue No. 2 (2011-3-9) Issue No. 1 (2010-10-6) Issue No. 0 (2010-7-5)
Status:	Current		
Date of Issue:	2011-03-09	Page 1 of 4	
Applicant:	Ampcontrol CSM Pty. Ltd 7 Billbrooke Close Cameron Park NSW 2285 Australia		
Electrical Apparatus:	Intrinsically Safe UPS		
Optional accessory:			
Type of Protection:	Ex e ia m Group I IP66		
Marking:	Ampcontrol IS UPS Ex ia ma e I (Tamb -20 °C + 60 °C) IP66 IECEX TSA 10.0008X 110-240 Vac S/N		
Approved for issue on behalf of the IECEx Certification Body:	Ujen Singh		
Position:	Quality & Certification Manager		
Signature: (for printed version)			
Date:	09 MARCH 2011		
1. This certificate and schedule may only be reproduced in full. 2. This certificate is not transferable and remains the property of the issuing body. 3. The Status and authenticity of this certificate may be verified by visiting the Official IECEx Website .			
Certificate issued by: TestSafe Australia 919 Londonderry Road Londonderry NSW 2753 Australia 			



IECEx Certificate of Conformity

Certificate No.: IECEx TSA 10.0008X

Date of Issue: 2011-03-09

Issue No.: 2

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Manufacturer: **Ampcontrol CSM Pty Ltd**
7 Billbrooke Close
Cameron Park 2285
Australia

Manufacturing location(s):

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended.

STANDARDS:

The electrical apparatus and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards:

IEC 60079-0 : 2004 Edition: 4.0	Electrical apparatus for explosive gas atmospheres - Part 0: General requirements
IEC 60079-11 : 2006 Edition: 5	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"
IEC 60079-18 : 2004 Edition: 2.0	Electrical apparatus for explosive gas atmospheres - Part 18: Construction, test and marking of type of protection encapsulation 'm' electrical apparatus
IEC 60079-7 : 2006-07 Edition: 4	Explosive atmospheres - Part 7: Equipment protection by increased safety "e"

*This Certificate **does not** indicate compliance with electrical safety and performance requirements other than those expressly included in the Standards listed above.*

TEST & ASSESSMENT REPORTS:

A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in

Test Report:

AU/TSA/ExTR10.0015/00
AU/TSA/ExTR10.0016/00
AU/TSA/ExTR10.0052/00
AU/TSA/ExTR11.0008/00

Quality Assessment Report:

AU/TSA/QAR06.0007/04



IECEx Certificate of Conformity

Certificate No.: IECEx TSA 10.0008X

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Schedule

EQUIPMENT:

Equipment and systems covered by this certificate are as follows:

The Intrinsically Safe UPS comprises of electronics and batteries mounted within a stainless steel enclosure, to provide a battery-backed, intrinsically safe power supply output. In addition to this output, it provides several other intrinsically safe monitoring and control connections, and a mains power input to maintain the battery. A user accessible front panel consisting of a display, keypad and indicator lamps are provided to allow interrogation and configuration of the IS UPS. The IS UPS consists of circuit boards namely - Input Board, Processor Board, Output Board and Terminal Board. The Battery Board PCB is encapsulated together with the batteries. The terminals of the batteries and the Input Board are encapsulated. The type of protection provided by the encapsulation of the Input Board is 'ma' and has been assessed in a separate test report 32120. The mains terminals are situated in a separate compartment of the stainless steel enclosure. The type of protection provided at the mains terminals is increased safety 'e' and it has been assessed in the test report 32120. The ISUPS is not to be energized when it is inside zone 0. The IS UPS is manufactured in a variety of variants, providing different battery capacities and intrinsically safe power supply output parameters. Variation of battery capacity is accommodated by separate enclosure types, while variation of output parameters is accommodated by allowing the fitment of varied components to configure the output.

CONDITIONS OF CERTIFICATION: YES as shown below:

See Annexe of this certificate for the conditions of certification.



IECEx Certificate of Conformity

Certificate No.: IECEx TSA 10.0008X

Date of Issue: 2011-03-09

Issue No.: 2

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DETAILS OF CERTIFICATE CHANGES (for issues 1 and above):

Refer the annexe for the variations permitted by issue 2 of the certificate.

Annexe: [Annexe for IECEx TSA 10_0008X-2.pdf](#)



IECEX Certificate of Conformity Annexe

Annexe for Certificate No.:	IECEX TSA 10.0008X	Issue No.:	2
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Drawing list pertaining to Issue- 0 of this Certificate:

Document No.	Sheets	Document Title	Issue	Date (yyyy/mm/dd)
IS UPS Battery Board				
IS UPS-Z-020	1	IS UPS Battery Board Schematic	3	2010/05/25
ISUPS-Z-021	5	IS UPS Battery Board PCB	3	2010/05/25
ISUPS-Z-022	1	IS UPS Battery Board BOM	3	2010/05/25
IS UPS Input Board				
ISUPS-Z-002	2	IS UPS Input Board Schematic	4	2010/06/16
ISUPS-Z-016	7	IS UPS Input Board PCB	3	2010/05/25
ISUPS-Z-024	3	IS UPS Input Board BOM	4	2010/06/16
IS UPS Output Board				
ISUPS-Z-015	2	IS UPS Output Board Schematic	4	2010/06/16
ISUPS-Z-019	5	IS UPS Output Board PCB	3	2010/05/25
ISUPS-Z-025	2	IS UPS Output Board BOM	4	2010/06/16
IS UPS Processor Board				
ISUPS-Z-014	3	IS UPS Processor Board Schematic	4	2010/06/16
ISUPS-Z-018	7	IS UPS Processor Board PCB	3	2010/05/25
ISUPS-Z-023	3	IS UPS Processor Board BOM	4	2010/06/16
IS UPS Terminal Board				
ISUPS-Z-013	1	IS UPS Terminal Board Schematic	4	2010/06/01
ISUPS-Z-017	5	IS UPS Terminal Board PCB	3	2010/05/25
ISUPS-Z-009	1	IS UPS Terminal Board BOM	3	2010/05/24
Transformer				
ISUPS-Z-003	1	IS. UPS Transformer Construction Details	4	2010/05/07
Assembly Drawings				
ISUPSZ004	1	Battery Module Component of Power Module S/Assy	2	2010/03/19
ISUPSZ005	1	UPS IS IECEx 110/240 300 Wh Version	4	2010/06/16
ISUPSZ006	1	UPS IS IECEx 110/240 65 Wh Version	4	2010/06/16
ISUPSZ010	1	S/Assy, Battery Pack, IS UPS, 65WH	2	2010/03/19
ISUPS-Z-011	1	S/Assy Power Module IS UPS PCB Part	1	2009/11/02
ISUPS Z012	1	ISUPS Enclosures	4	2010/05/07
ISUPS-M-018	3	IS UPS LABELS Manufacturing Details	2	2010/05/11
ISUPS-Z-027	2	IS UPS Model Creation Procedure	1	2010/04/06
ISUPS-Z-028	1	IS UPS Block Diagram	4	2010/06/16

Certificate issued by:

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IECEx Certificate of Conformity Annexe

Annexe for Certificate No.:	IECEx TSA 10.0008X	Issue No.:	2
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Document No.	Sheets	Document Title	Issue	Date (yyyy/mm/dd)
ISUPS-Z-029	5	IS UPS User Manual Inclusion	0	2010/06/16

Conditions of Certification pertaining to Issue -0 of this Certificate:

The following conditions of safe use must be taken into account when installed.

1. The mains power input must not be used when installed in Zone 0.
2. The following input/output parameters must be taken in to account when installed.

Terminals X8, X9, X10; mains supply input:
 $U_m = 250 \text{ Vac}$

Terminal X7; External Start Push Button:
 $U_o = 32.5 \text{ V}$
 $I_o = 24 \text{ mA}$
 $L_o = 100 \mu\text{H}$
 $C_o = 0.040 \mu\text{F}$

Terminal X6; DC Output:

Configuration	U_o	I_o	C_o	L_o	L_o/R_o
1	15.1 V	1.50 A	1.0 μF	200 μH	87.17 $\mu\text{H}/\Omega$
2	15.1 V	0.51 A	1.0 μF	200 μH	87.17 $\mu\text{H}/\Omega$
3	15.1 V	0.47 A	2.01 μF	520 μH	87.17 $\mu\text{H}/\Omega$
4	15.1 V	0.50 A	1.0 μF	200 μH	87.17 $\mu\text{H}/\Omega$
5	14.5 V	1.50 A	1.0 μF	200 μH	87.17 $\mu\text{H}/\Omega$
6	12.6 V	2.50 A	2.0 μF	167.2 μH	33 $\mu\text{H}/\Omega$
7	12.6 V	2.40 A	2.0 μF	167.2 μH	33 $\mu\text{H}/\Omega$
8	12.6 V	2.00 A	502 nF	164 μH	40.1 $\mu\text{H}/\Omega$
9	12.6 V	2.00 A	20.54 μF	102.1 μH	39 $\mu\text{H}/\Omega$
10	15.1 V	1.50 A	2.09 μF	181.5 μH	79 $\mu\text{H}/\Omega$

The above output parameters C_o , L_o , L_o/R_o were determined based on spark testing. The same C_o , L_o , L_o/R_o values are allowed to be used with models of ISUPS when configured with lesser U_o and/or I_o values.

Terminal X5; Digital Input 1
 $U_o = 16.5 \text{ V}$
 $I_o = 16.8 \text{ mA}$
 $L_o = 100 \mu\text{H}$
 $C_o = 1 \mu\text{F}$

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IECEx Certificate of Conformity Annexe

Annexe for Certificate No.:	IECEx TSA 10.0008X	Issue No.:	2
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Terminal X4: Digital Input 2 & 3

$U_i = 16.5V$

$U_o = 0V$

Terminal X3; Pins 1 & 2 (data for RS-485):

$U_i = 7.14 V$

$C_i = 0.221\mu F$

$L_i = 0 \mu H$

$U_o = 5.88V$

$I_o = 124mA$

Terminal X3 Pins 3 & 4 (Power Supply for RS-485):

$U_i = 16.5 V$

$I_i = 2.8A$

$C_i = 0 \mu F$

$L_i = 0 \mu H$

Terminal X2; Relay 1:

$U_i = 30Vdc$

$I_i = 3A$

$U_o = 0 V$

Terminal X1; Relay 2 and Relay 3:

$U_i = 30Vdc$

$I_i = 3A$

$U_o = 0 V$

Certificate issued by:

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IECEX Certificate of Conformity Annexe

Annexe for Certificate No.:	IECEX TSA 10.0008X	Issue No.:	2
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Variations permitted by issue 1 of the certificate:

Following drawings were assessed in test report AU/TSA/ExTR10.0052/00 (TR32600, TestSafe).

Drawing list pertaining to Issue 1 of this Certificate:

Document No.	Sheets	Document Title	Issue	Date (yyyy/mm/dd)
		IS UPS Input Board		
ISUPS-Z-002	2	IS UPS Input Board Schematic	5	2010/09/21
ISUPSZ024	3	IS UPS Input Board BOM	5	2010/09/21
ISUPSZ031	1	IS UPS Input Board Rev-3 Modification Procedure	0	2010/09/20
		IS UPS Processor Board		
ISUPS-Z-014	3	IS UPS Processor Board Schematic	5	2010/09/13
ISUPS-Z-018	7	IS UPS Processor Board PCB	4	2010/09/13
ISUPS-Z-023	3	IS UPS Processor Board BOM	5	2010/09/13
ISUPSZ030	1	IS UPS Processor Board Rev-3 Modification Procedure	0	2010/09/13
		Assembly Drawings		
ISUPSZ004	1	Battery Module Component of Power Module S/Assy	3	2010/09/14
ISUPSZ10	1	S/Assy, Battery Pack, IS UPS, 65 Wh	3	2010/09/14

Conditions of Certification pertaining to Issue 1 of this Certificate:

There are no new conditions pertaining to this issue. Previous conditions of certification are unchanged.

Certificate issued by:

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IECEx Certificate of Conformity Annexe

Annexe for Certificate No.:	IECEx TSA 10.0008X	Issue No.:	2
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Variations permitted by issue 2 of the certificate:

Following changes were made to the Input Board:

Resistor values of R62 and R75 are changed. The regulator U4, LM3075 is changed to LM5116. The BOM and PCB tracks were also changed accordingly.

Following changes were made to the Output Board:

The transistors Q1, Q2, Q3 are changed from SPP80N06S2L-07 to IPP80N06S2L-06 or to FDP5800. The value of resistors R49, R51, R53, R55 are changed. The Bill of Materials and the schematic are also changed.

The above changes were assessed in test report AU/TSA/ExTR11.0008/00 (TR32756).

Drawing list pertaining to this variation:

Document No.	Sheets	Document Title	Issue	Date (yyyy/mm/dd)
		Input Board		
ISUPS-Z-002	2	IS UPS Input Board Schematic	6	2011/02/28
ISUPS-Z-016	7	IS UPS Input Board PCB	4	2011/02/28
ISUPSZ024	4	IS UPS Input Board BOM	6	2011/02/28
		Output Board		
ISUPS-Z-015	2	IS UPS Output Board Schematic	6	2011/02/16
ISUPSZ015	3	IS UPS Output Board BOM	6	2011/02/16

Conditions of certification pertaining to Issue 2:

There are no new conditions of certification pertaining to this variation. Previous conditions of certification are unchanged.

Certificate issued by:

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APPENDIX C – MSDS



Industrial Batteries Department
Viale Europa, 63 - 36075 Montecchio Maggiore (VI)
ITALY

MATERIAL SAFETY DATA SHEET
FIAMM BATTERIES: SLA/FAT/UMTB

PRODUCT CHARACTERISTICS

PRODUCT

Valve Regulated Lead Acid Sealed batteries with absorbed electrolyte wet (non spillable).

PRODUCT TECHNICAL COMPONENTS

Components	Description	%
Lead and Compounds	Pb, PbO ₂ , PbSO ₄	70-80
Electrolyte	Sulphuric acid in max concentration of 35%	12-20
Polymer	ABS	6-9

TECHNICAL NAME OF DANGEROUS SUBSTANCE

Sealed batteries containing a solution of sulphuric acid and distilled water, completely absorbed in separators.

PROPERTIES OF CONTAINER

ABS polymer, flame retardant FV0, anti-cracking.

PROPERTIES OF DANGEROUS SUBSTANCE

Liquid, clear, colourless.

BOILING POINT OF DANGEROUS SUBSTANCE

110° C

CLASSIFICATION OF DANGEROUS SUBSTANCE

Class 8
Code page IMDG IMCO No.8121
UN No 2800

PACKAGING REQUIRED FOR TRANSPORTATION

Batteries have to be packed in strong outer packagings after insulating each cell terminals.

Packaging Group III

IMPORTANT NOTE

There is no electrolyte in liquid status inside the battery due to the fact that this electrolyte is completely absorbed by a spongy material.

This means that even if you turn upside down (ermetically closed) there will be no leakage of the electrolyte.

Conditions will not change below boiling point (110° C).

SAFETY DATA

NATURE OF HAZARD

Corrosive liquid electrolyte causes damage to eyes, skin & air passages.
Attacks many materials & clothing.
Attacks many metals with liberation of hydrogen which is flammable and forms an explosive mixture with air.
Stored electrical energy.

PROTECTIVE MEASURES

Goggles giving complete protection to eyes, acid resistant clothing and gloves, and safety footwear.
Have available an eyewash bottle with clean water.
Store in a cool dry place.
Keep all vent plugs in position.
Charge in a well ventilated area, avoid breathing mist.
Keep away from sources of ignition, do not allow smoking or any naked lights.
Keep away from children.
For safe operating practices see BS 6287:1982

FIRST AID

If substance has got into eyes, immediately wash out with plenty of water.
If ingested drink copious amounts of water and seek immediate medical attention.
Remove any contaminated clothing and wash skin with water.
Seek medical treatment.

SPILLAGE

Close off or contain leak if without risk, using plastic containers if available.
Neutralise with soda ash, sodium carbonate or sodium bicarbonate.
If undiluted substance has entered a watercourse or contaminated soil or vegetation, advise local authority.

FIRE

If circuit still made, and if safe to do so, the emergency services may sever cables with fireman's axe.
Smother with dry powder or foam.
If necessary keep containers cool by spraying with water.

DISPOSAL

This product is defined in SI 232:1994 as being for fitment to an excluded appliance.
The cells contain heavy metal and must not be put out for collection in refuse containers.
Keep all constituents enclosed and upright.
Dispose of only to authorised scrap recoverer.
Move only in accordance with local authority requirements.
Do not incinerate or throw away.

Fiamm Asia Pacific Pte Ltd
36 Tuas Crescent
Singapore
Tel 0065 8653278
Fax 0065 8626550